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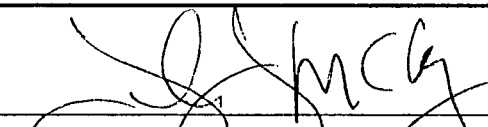
Technical Specifications  
For  
Converted Aquifer Wastewater Treatment  
(CAWWT) Facility

Document 4518-TS-0001  
Revision 0

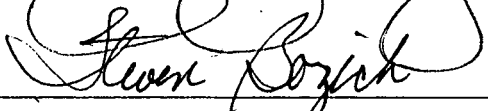
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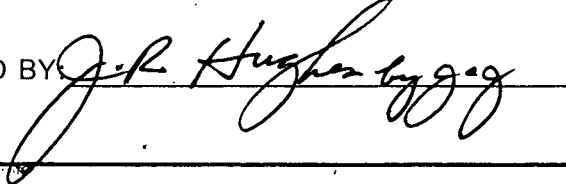
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 8/11/04

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 8/16/04

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U.S. DEPARTMENT OF ENERGY  
FERNALD CLOSURE PROJECT

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**U.S. DEPARTMENT OF ENERGY  
FERNALD CLOSURE PROJECT**

**Converted Aquifer Wastewater Treatment (CAWWT) Facility Technical Specifications**

Technical specifications contained in this document detail requirements for the  
Converted Advanced Waste Water Project to be self performed by Fluor Fernald.

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## SPECIFICATION REVISION RECORD

Spec. No./Rev.	Description	Approval	Date
01010, Rev. 0	Functional Requirements		8/12/04
02222, Rev. 0	Excavating		8/12/04
02223, Rev. 0	Backfilling		8/12/04
02668, Rev. 0	Site Underground Pipelines		8/12/04
03001, Rev. A	Concrete		8/12/04
05500, Rev. 0	Metal Fabrications		8/12/04
09900, Rev. 0	Painting		8/12/04
13400, Rev. 0	Process Instrumentation		8/12/04
15060, Rev. 0	Pipe, Fittings, Valves, and Accessories		8/12/04
15140, Rev. 0	Supports and Anchors		8/12/04
15160, Rev. 0	Pumps		8/12/04
15190, Rev. 0	Mechanical Identification		8/12/04
15260, Rev. 0	Piping Insulation		8/12/04
16050, Rev. 0	Basic Electrical Materials and Methods		8/12/04
16095, Rev. 0	Minor Electrical Demolition		8/12/04
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16370, Rev. 0	Overhead Power Distribution		8/12/04
16462, Rev. 0	Pad-Mounted Transformers		8/12/04
16470, Rev. 0	Panelboards		8/12/04
16475, Rev. 0	Overcurrent Protective Devices		8/12/04
16855, Rev. 0	Heating Cables		8/12/04

Title: Specifications for the Converted Advanced WasteWater Treatment Plant	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 01010	Rev. 0

Approved:  8/01

## SECTION 1010

### FUNCTIONAL REQUIREMENTS



## CAWWT Functional Requirements/Design Basis , Stage 1, Revision 0

### 1. Objectives

The objective of the CAWWT Project is to provide for Fernald Closure Project (FCP) wastewater treatment within a centralized small physical area. This will allow for the safe shut down, dismantling, and disposal in the On Site Disposal Facility (OSDF) of around 90% of the Advanced Wastewater Treatment (AWWT) facility and its underlying impacted soil. The objective of the CAWWT Project will be accomplished by modifying, upgrading, and supplementing the existing AWWT Expansion (Phase III) System. The CAWWT Project is supported by the DOE and EPAs.

The CAWWT facility must be able to reliably treat FCP groundwater and wastewater to assure meeting FCP effluent discharge limits for uranium (30 ppb monthly average and 600 pounds per year). The CAWWT facility must be designed to support the most cost effective groundwater infrastructure to remain after FCP "closure" in June 2006. The CAWWT groundwater treatment system must be designed for an additional ten year service life.

See drawings no. 51D-5500-X-01324 and 51D-5500-P-01326 for the footprint for the CAWWT Project. The footprint includes the west low bay of Building 51 and a portion of the tank farm to the south. A low north to south wall will be added to form a containment area for the remaining tanks used in the CAWWT system (tank 1, 344, 345, and 221).

The CAWWT Project will be constructed in stages. The AWWT Expansion will need to be shut down allowing for major process and utility reconfiguration. The AWWT Phases I and II, IAWWT, and SPIT will continue to operate (including the Phase I and II equipment within the CAWWT Project footprint) during the construction. After successful start up of the converted AWWT Expansion equipment, the AWWT Phases I and II will be shut down and its equipment in the CAWWT Project footprint will be removed. Support facilities described in Sections 2C and 2D will then be installed in the vacated space as part of Stage 2 construction.

This document specifically describes the work to be done in Stage 1 (converting the AWWT Expansion system) and includes a general description of the Stage 2 work. Specific details of the Stage 2 work will be developed and a revised Functional Requirements/Design Basis Document will be issued at a later date.

## **2. Functional Requirements**

The first step in the design process is to identify the functional requirements. The functional requirements establish what the final design must be capable of doing. These set the baseline on which the design basis is developed. Five basic functions were identified for the CAWWT Project. They were:

- A. Treat groundwater
- B. Treat storm and remediation wastewater
- C. Handle solid waste
- D. House supporting functions
- E. Relocate utilities and piping allowing for AWWT Phases I and II D&D

### **2A. Treat groundwater**

The FCP is on a path to closure by June 2006. All remedial actions at the site are scheduled to be complete with the exception of groundwater remediation. A Comprehensive Groundwater Strategy Report was issued in June 2003. The Report's purpose was to identify a groundwater remediation approach that resulted in the most cost effective infrastructure remaining at Fernald after site closure. The CAWWT Project arose from that study and subsequent agreements made with Fernald stakeholders.

The existing AWWT Expansion system is capable of treating groundwater at an operating rate of 1800 gpm. The converted AWWT Expansion system will be needed to treat stormwater and remediation wastewater from February 2005 (scheduled AWWT Phases I and II shut down) until June 2006 (FCP site closure). Volumes of those wastewaters will be diminishing as the site remediation progresses. The CAWWT project will modify the AWWT Expansion system to provide a 1200 gpm groundwater treatment system and a stormwater/remediation wastewater treatment system capable of being operated at up to 600 gpm.

The 1200 gpm groundwater treatment system will consist of two (of the four existing) multimedia filters and two (of the three existing) ion exchange unit paired trains. The other two multimedia filters and one ion exchange pair will be modified to become the stormwater and remediation wastewater treatment train.

The existing aeration tank (TNK-1) and aeration blower will continue to be included in the groundwater system allowing for possible future reinjection of the treated groundwater (via the Storm Sewer Outfall Ditch) and for reuse of major pumps and piping. The three existing feed pumps (design point of 900 gpm at 320' tdh) are planned to continue to be used. The aeration tank will be used as a source of filter and ion exchange unit backwash water. The maximum backwash flow rate needed is 1100 gpm (at about 140' to 210' tdh), within the capabilities of a feed pump (the pump curve shows about 280' tdh when pumping at 1100 gpm). The process piping and controls will be

revised to allow two pumps to normally serve as process feed pumps and one to normally serve as backwash supply pump.

Piping revisions inside Building 51 will include separating two of the four parallel piped multimedia filters for groundwater (the other two are to be used in the storm and remediation wastewater train) and separating two of the three ion exchange trains for groundwater service. Outside Building 51 the treated effluent line currently runs along the length of the Building to the east and ties into an above ground pipe manifold (the "Christmas tree"). The CAWWT effluent line will be rerouted to discharge to the west. The rerouted effluent will include the existing duplex strainer resin trap.

## **2B. Treat storm and remediation wastewater**

One train of the AWWT Expansion will be converted to a treatment train for storm and remediation wastewater. Based on past agreements with regulators, the treatment needs to include granular activated carbon. This will be accomplished by converting one of the existing Expansion multimedia filters to activated carbon service. The treatment process will include one existing multimedia filter followed by the activated carbon filter followed by an existing ion exchange train.

The SWRB will continue to be used as the headworks, providing surge capacity for the modified 600 gpm treatment system until the SWRB is taken out of service for remediation, scheduled for November 2005. The BSL is scheduled to be taken out of service after completion of the Waste Pits Project. The BSL currently is used to provide surge capacity for leachate from the OSDF prior to treatment. It's planned to pipe OSDF leachate into the SWRB to provide surge capacity (similar to that provided by the BSL). Two existing 15,000 gallon tanks, currently used for treated eluate storage, (tanks 344 and 345) will be converted to be used as incoming settling and break tanks for the wastewater. Leachate, stormwater, and excavation water will be pumped directly into the CAWWT Project settling and break tanks from November 2005 (SWRB closure) through June 2006 (site closure). Throttling valves will be provided in each line feeding tanks 344/345. Collected stormwater and leachate total volumes are expected to be much less during that time period. The CAWWT Project will provide flow meters for leachate into the SWRB and tanks 344/345 and flow differential alarms compared to the leachate lift station flow meter (similar to the existing system).

It's anticipated that the 600 gpm capacity will normally be more than adequate for those waste streams during the time period between April 2005 (AWWT shutdown) and June 2006 FCP closure. Incoming piping will be modified to allow groundwater to also be fed into the stormwater headworks tanks. After FCP closure, the only wastewater flow remaining will be a small amount (expected to be less than 1 gpm) of OSDF leachate. The method for OSDF leachate treatment during post closure is not firmly established. It may either be treated in a to-be-evaluated passive treatment process (field testing was initiated in April 2004), by trucking it to a Metropolitan Sewer District wastewater treatment plant, or continue to be treated in the site's wastewater treatment facility.

Modifications to the process include new feed lines (stormwater, leachate, and groundwater with individual flow metering and tank level control valves) into tank 344, a duplex strainer debris trap on the stormwater inlet to tank 344, modified piping overflowing tank 344 to tank 345, two new feed pumps (600 gpm at 320' tdh) from tank 345 to the multimedia filter, repiping to direct flow in series to one multimedia, one modified filter containing activated carbon, and one ion exchange train. Cross connecting piping will be installed to allow the stormwater/remediation wastewater to be treated in the groundwater system in emergency situations.

## **2C. Handle solid waste**

The two main solid wastes in this project are suspended solids in the incoming groundwater, stormwater, and remediation wastewater and spent media (primarily ion exchange resin).

In the existing treatment systems, the incoming suspended solids are removed by settling, clarification and/or by filtration. Some settling occurs in the SWRB and BSL. The AWWT Phases I and II have clarifiers followed by multimedia filters. The AWWT Expansion, IAWWT, and SPIT have multimedia filters, (no clarifiers). All of the multimedia filters are backwashed to the SWRB, where the solids are given time to settle. The filter backwash outlet stream is combined with stormwater in the SWRB and is subsequently run through a treatment system.

The IAWWT has been operated successfully for many years treating SWRB wastewater. The IAWWT has no clarifier. Based on operational experience at IAWWT, it's anticipated that the CAWWT stormwater treatment train will operate successfully without a clarifier as long as the SWRB is in service (until November 2005).

Recent sampling and analysis of backwash water from the AWWT Expansion System multimedia filter and ion exchange units indicate that these streams are low in uranium and total suspended solids concentration. The backwash water from the groundwater multimedia and ion exchange units will continue to be routed to the SWRB (through a relocated pipeline). It's anticipated that after the shutdown of the SWRB, the backwash water from the groundwater treatment system will be discharged with the treated effluent, pending further analysis and justification.

The storm and remediation wastewater contain varying amounts of sediment. Tanks 344 and 345 will serve as a settling and a feed tank for storm and remediation wastewater. The existing air operated diaphragm pumps on those tanks bottom nozzles will be replaced with higher flow rated progressive cavity pumps allowing settled solids to be pumped off to tank 221.

The storm and remediation wastewater process equipment may continue to be backwashed to the SWRB until the SWRB is taken out of service. A Technical Assistance Team was formed and provided recommendations for handling the incoming wastewater and recycled backwash water for the time period after the SWRB is taken out

of service. Close communications between Soils and AWWT personnel, control of suspended solids at the source, and use of an excavation near AWWT for backwash water recycle were the key recommendations of the Team. CAWWT backwash water effluent piping revisions will be made in Stage 2 of the Project.

The ion exchange resin is free draining. The CAWWT Project will provide a means of preparing resin and filtration media for off site disposal. Specific details will be developed and implemented as part of Stage 2 of the CAWWT Project.

## **2D. House supporting functions**

Supporting functions will be designed and installed as part of Stage 2 of the CAWWT Project. Current plans include installing prefabricated modular structures to be used for office, control room, analytical laboratory/sample preparation, break/eating, and rest/wash room. The project will consider use of an existing modular structure. Preliminary judgements suggest a 12' by 20' area for a combination control room, office, eating/break area and 12' by 20' area for the analytical lab/sample prep area, and 8' by 12' rest/wash room. The control system for start up of the CAWWT will need to be provided in an area that will allow for later demolition of the Phases I and II equipment.

Cost effective ion exchange resin regeneration will no longer be feasible. The CAWWT Project plans to buy activated carbon for the converted multimedia filter and will purchase replacement media (multimedia filter media and ion exchange resin) for the treatment equipment, if replacement is economically justified. Future resin replacement will be infrequent and lessening as the uranium concentration continues to decrease in the water pumped from the aquifer. Floor space will be needed for ion exchange resin replacement. The preferred layout for CAWWT would be to leave the vacated area north of the process equipment relatively clear, to allow for set up for resin removal and replacement and to install the modular structures to the east. See drawing 51D-5500-P-01326.

Space will be needed and is available for an instrument air compressor and dryer and for maintenance work. It's expected that the remaining building will be able to house all of the ancillary functions, however the CAWWT area will not have enough space to routinely store large quantities of ion exchange resin.

The eastern wall of the west low bay of Building 51 will need to be modified to serve as an outside wall. The existing roll up doors serve as internal partitions and will be removed. The wall structural members will be reinforced as required and sheathed for weather protection. If cost effective, siding will be reused from sections of the building to be demolished.

Other services needed in the CAWWT facility include utilities described in Section 2E, phone service, a roadway from Willey Road, a modest parking area, and fire protection water service for sprinklers.

## **2E. Relocate utilities and piping allowing for AWWT Phases I and II D&D**

The CAWWT Project will need to be totally isolated and self supporting to allow for D & D of the remaining unused AWWT facility. All wastewater inlet and outlet streams and all utilities need to be physically separated.

Plans are to use the existing underground piping corridor to the west and south of the AWWT and the existing pipe bridge feeding Tank 1. Using those pipe routes is not expected to interfere with any soil excavation. The project expects to be able to make extensive reuse of existing pipelines.

Electricity is currently fed at 13.2 kV into the Building 51 unit substation. Stepped down 480 volt, 3 phase power is fed through a circuit breaker to motor control center MCC-7, which houses motor control cabinets for all of the existing AWWT Expansion Project large motors. All of that equipment sits outside the CAWWT footprint and the CAWWT Project electricity needs to be segregated from the Building 51 unit substation for D&D of the rest of the AWWT complex. Power wiring to the CAWWT large motors is routed outside the CAWWT footprint. Electrical heat tracing is fed through a contactor sitting outside the CAWWT footprint. 277 volt single phase lighting, 110 volt single phase lighting, convenience, and instrumentation/control power wiring also need to be relocated/modified.

Other utility services include potable water, natural gas, and instrument air. Potable water and natural gas lines are available in the underground corridor to the west of AWWT. Reuse of the existing building heating unit will require relocation of a natural gas pressure reducing station and relocation of power wiring and the heater's thermostat/remote control panel. An instrument air system (compressor and dryer) will need to be provided. Reuse of an instrument air system from the Silos Project will be evaluated. Potable water will be used for the building's sprinkler system

AWWT controls and operator interface are currently through a proprietary distributed control system (dcs). Major components in this system were originally supplied in 1994 through Fischer and Porter (no longer a business entity). Legacy service through Fischer and Porter's acquiring owner (ABB, Limited) has deteriorated with time. Continued reliance on ABB is risky for the CAWWT Project. A much simpler, modern, programmable logic controller (plc) will be provided for the CAWWT project.

All of the AWWT Expansion System instrumentation inside Building 51 is wired through a remote terminal unit (RTU-9) with communication wiring to the dcs. The CAWWT Project will make use of the remote terminal unit and instrument terminations. The plc unit and a local human machine interface station will be mounted inside RTU-9's cabinet.

The instruments outside of Building 51 are currently wired through RTUs outside the CAWWT footprint. A new RTU cabinet will be installed in the tank farm area just outside Building 51 and local instrument wiring will be terminated at the new RTU. The

new RTU will be connected by communication cable to the plc. Wireless communication to the plc will be established for operation of the SWRB pumping station and interface/alarms with the OSDF leachate permanent lift station.

Well operations are controlled locally at each well house with an ABB single loop Micro DCI controller or remotely through the existing control system. Relocation and rewiring of fiber optics converters from the AWWT control system to the CAWWT plc system and installation of an HMI OPC (Object linking and embedding for Process Control) server will made to allow well monitoring and operation from the CAWWT control room.

It's expected that the Slurry Dewatering Facility (SDF) will be needed for some time after AWWT Phases I and II are taken out of service (for dewatering slurries from AWWT equipment cleanouts for safe shutdown). The SDF filtrate outlet line will need to be repiped into the CAWWT process (by way of tank 344).

Stormwater from the WPRAP SWM Pond and the Waste Pit Area Runoff Collection Pond ("the Cement Pond") is currently pumped to the BSL. After the BSL is taken out of service, the stormwater may continue to require treatment before discharge. The stormwater would need to be piped to the CAWWT stormwater headworks (SWRB or tanks 344/345). It's currently planned for the Soils group to install the replacement piping as part of the BSL and Waste Pits soil remediation effort.

The existing trench drains are collected in the South Sump and pumped to tank 155. That pumping station will continue to be used for CAWWT Stage 1, with the pumping station temporarily piped to CAWWT Tank 344. Installation of a sump/pumping station with level control and alarm will be made during Stage 2. This work is being deferred to Stage 2 due to constructability issues.

APPROVED FOR THE PROJECT  
 DATE: 10/11/01  
 BY: [Signature]  
 TITLE: [Title]  
 DEPARTMENT: [Department]  
 PROJECT: [Project Name]

### **3. Design Basis**

The CAWWT project is a major remodeling effort. As much as possible any new equipment and piping will match specifications for the existing. The CAWWT groundwater treatment equipment will be designed for a ten year operating life.

#### **3A. Treat Groundwater**

Groundwater treatment will be in existing equipment (tank 1, groundwater pumps, multimedia filters, and ion exchange units). Piping revisions will be made to form two treatment trains each consisting of a multimedia filter and two ion exchange units. Piping specifications will be as existing (schedule 40, black steel, ASTM A53).

Outdoor piping will be electrically heat traced and insulated. Indoor piping will be insulated, where needed, to reduce condensation in walkways. Outdoor pipe insulation will be glass fiber (ASTM C547) with aluminum jacket (ASTM B209). Indoor anti-condensation insulation will be slit flexible cellular elastomeric insulation. Heat tracing will be 120V, self-limiting electric tracing cable.

Hand operated valves will be resilient seated butterfly type (ASTM A126), ball (ASTM A105), and gate (ASTM A105). Valves will be equipped with locking devices.

Filter media and ion exchange resin will be replaced (if warranted) in the existing units. Filter media specification (meeting AWWA B100-01), sizing, and quantity will match existing, as in Parsons sketch SK-M-04380. Ion exchange media will be 314 cu feet per vessel of type I strong base anion exchange resin with successful operating history at the FCP. The specific resin brand name will be specified by Operations.

#### **3B. Treat storm and remediation wastewater**

Storm and remediation wastewater treatment will be in reconfigured existing equipment. The same design parameters described in Section 3A will apply to the storm and remediation wastewater equipment.

Activated carbon will be 9000 pounds of 8 by 30 mesh granular activated carbon meeting AWWA B100-01.

Storm water feed pumps will be ANSI B73 horizontal centrifugal pumps mounted on a rigid cast iron base plate for pump and motor. The pumps will be of ductile iron construction with single inside mechanical seals. A design point of 600 gpm at 320' tdh allows for as much as 20 psi pressure drop in each process vessel. The pump motors will be 460 volt, 3 phase, energy efficient, TEFC. Dial pressure gauges will be provided at pump outlets. The gauge connections will be block and bleed type, allowing for gauge maintenance and calibration during routine operation.



The influent debris strainer will be an 8" duplex strainer providing for continuous flow. The strainer will be of iron construction, with 1/8" perforated stainless steel baskets, vent and drain valves, a differential pressure gauge with switch connections, and quick opening covers requiring no tools.

Above ground piping, manual valving, insulation, and electrical heat tracing will be as described in Section 3A for the groundwater treatment system. Level control valves will be full port v-ball type with similar specifications to existing valve FCV-1007. Flow meters will be magnetic type with similar specifications to existing meter FE-1008/FIT-1008.

### **3C. Handle solid waste**

Progressive cavity pumps will be installed on the drain nozzles of tanks 344 and 345. The pumps will be used for removal of settled solids. The pumps will be piped to discharge into tank 221. Tank 221 will be used as a surge tank for filter and ion exchange unit backwash effluent water. The progressive cavity pumps will have a nominal capacity of 10 gpm. The pumps will be existing spare clarifier bottoms pumps.

### **3D. House supporting functions**

The design basis for supporting functions will be established as part of Stage 2 of the CAWWT Project.

### **3E. Relocate utilities and piping allowing for AWWT Phases I and II D&D**

Relocated process piping needed for the CAWWT Project includes treated effluent routed to the SWRB Valve House, inlet wastewater from the SWRB, and backwash effluent to the SWRB Valve House. The CAWWT Project plans to make extensive reuse of some existing pipelines that will be going out of service. The treated effluent line will use the sections of reinjection tank fill line and the well 26, 27, and 28 treatment bypass line to connect to the existing effluent header. The inlet wastewater to the SWRB will use another section of the reinjection tank fill line and a section of the BSL inlet to AWWT piping. The backwash effluent will be piped into tank 221 and pumped through sections of the leachate transmission pipeline. Two existing Expansion system backwash pumps will be relocated to serve as backwash transfer pumps. Leachate piping into the SWRB will be made using an existing connection into a storm sewer feeding the SWRB. The connection will be revised to accommodate a flow meter.

See drawing no. 51D-5500-G-01325 for a site plan of the revised piping. This reconfiguration is considerably less costly than installing new piping and pipe supports.

During Stage 2 construction, two sump pumps rated at 50 gpm at 30' tdh will be installed in the trench near tank 221. These will be used to pump the trench to tank 344. Pump operation will be on-off controlled by level switches.

Above ground piping, manual valving, insulation, and electrical heat tracing will be as described in Section 3A. Underground piping will match the existing fusion welded SDR-11 HDPE. Site preparation, earthwork, and trenching for underground piping will comply with ODOT standards.

Electrical work will comply with the latest revision of NFPA 70 (the National Electric Code). Transformers, motor control cabinets, disconnect switches, conduit, wire, cable tray, and general materials will comply with recognized national standards.

The Project will replace the ABB dcs with a Siemens S300 plc. Existing remote terminal unit RTU-9 will continue to serve as an instrumentation junction cabinet and will house the plc. A new RTU cabinet (RTU-10) will be provided for the instrumentation in the CAWWT tank farm and will connect to the plc by Profibus communication cables. Spread spectrum wireless transmitters will be used for the remote equipment at the SWRB and OSDF leachate permanent lift station.

Concrete for foundations will have at least 3000 psi compressive strength and concrete for slabs will have at least 4000 psi compressive strength at 28 days per ACI 318.

Structural steel and anchor bolts will conform to ASTM A-36. Structural connecting bolts will be high-strength conforming to ASTM A-325. Structural welding will conform to AWS D.1.1.

#### 4. Stage One Statement of Work

The following is a description of the work to be done in Stage One of the CAWWT Project.

1. Replace filter media with granular activated carbon in 1 tank (existing MMF-4). Replace ion exchange resin in (if required) up to 6 tanks, filter media in (if required) in up to 3 tanks.
2. Revise indoor piping at Expansion System multimedia filters and ion exchange units. Groundwater treatment will include two multimedia filters and two ion exchange pairs. Storm/wastewater treatment will include one multimedia filter, one activated carbon filter and one ion exchange pair. Install cross connection piping and valving from stormwater pump outlet to inlet to groundwater filters. Install cross connecting piping and valving from groundwater filter outlet to stormwater activated carbon inlet.
3. Remove piping to be no longer used, i.e. filter air scour and blow down and IX regeneration and rinse piping.
4. Revise outdoor above ground piping to connect tanks 344 and 345 (344 to overflow into 345). Install electric heat trace and insulate piping.
5. Run outdoor above ground pipeline with duplex strainer, pneumatically operated control valve, and flow meter to feed SWRB to tanks 344/345. Install electric heat trace and insulate piping. Tie in to idle BSL feed line to AWWT, once the BSL is taken out of service.
6. Install outdoor above ground pipeline with pneumatically operated control valve and flow meter to feed groundwater to tanks 344/345. Install electric heat trace and insulate piping. Tie in to existing groundwater feed line.
7. Install below grade pipeline with flow meter in LTS line to SWRB (connection to storm sewer exists in manhole 142). See drawing 51D-5500-P-01328. Provide throttling valve for LTS lift station pumps. (Needs to be done before BSL is out of service.)
8. Install outdoor above ground pipeline with control valve and flow meter to feed LTS to tanks 344/345. Install electric heat trace and insulate piping. Integrate flow signal into flow recorder/differential alarm. (This is not needed for CAWWT start up, but later construction would create interferences with operations).
9. Install 2 new (600 gpm at ~320' tdh) feed pumps and valving on tank 345. Run outdoor above ground piping into building to feed wastewater multimedia filter. Install electric heat trace and insulate pumps and piping.
10. Run outdoor above ground pipeline from groundwater feed pump outlet to backwash flow control inlet. Install electric heat trace and insulate piping. Revise pump outlet piping and valving.
11. Reroute groundwater clean effluent outlet outdoor above ground piping to run to the west within project footprint. Piping to include relocation of existing duplex strainer and differential pressure transmitter. Install electric heat trace and insulate piping. Tie into out-of-service reinjection tank fill line.
12. Reroute backwash outlet outdoor above ground piping into tank 221. Install backwash surge tank 221 outlet pumps and valving. Expansion backwash pumps will be

available (400 gpm at 140' tdh) will be used for this service. Install electric heat trace and insulate pump(s) and piping. Tie into new LTS pipeline.

13. Major underground piping needs for project include feed line from SWRB, treated effluent outlet, and backwash outlet. These will be accomplished by using underground lines being taken out of service. Install valve and connect SWRB outlet to out-of service injection tank fill line. Install valve and check valve and connect well 26, 27, and 28 bypass (a.k.a. Arasa reroute) to effluent line. Tie in out-of service injection tank fill line to Arasa reroute. See drawings 51D-5500-P-01328, -01329, and -01330.

14. Install pipe connection to tank 344 for Stage 2 sump pumping station. Heat trace and insulate piping.

15. Install wall to form containment area for tanks 1, 344, 345, and 221.

16. Pipe SDF outlet to tank 344. Heat trace and insulate outdoor piping. (not needed for CAWWT start up, but later construction would create interference with operations).

17. Install 2 progressive cavity pumps. Use existing air operated diaphragm pump suction piping from tanks 221, 344, and 345. Pipe pump outlet into tank 221 (backwash surge tank). Heat trace and insulate pumps and piping.

18. Install new unit substation for CAWWT. Relocate MCC-7. Run electrical feed into new unit substation. Run wiring from unit substation to motor control centers (new power panel pp-51C1 and relocated MCC-7). Power existing and new 480 volt 3 phase equipment through MCC (existing 3 groundwater pumps, existing aeration blower, 2 "new" stormwater pumps, existing north heating unit, existing roof fans, welding outlet, 2 "new" sump pumps, 2 relocated backwash surge tank outlet pumps, 2 relocated storm/wastewater surge tank bottoms pump).

19. Reroute 480 volt power to east heating unit (to heat Building 51 during CAWWT construction, needed if MCC-7 is relocated for CAWWT).

20. Relocate heat trace transformer and control cabinet (HTX-7 and HT-7). Rewire and power existing and new heat tracing by way of HT-7.


21. Install new CAWWT control system (plc, modified RTU backplates, new RTU-10, wireless transmitters and receivers, industrial computer, Ethernet switch, OPC server) components. Install new and relocate some existing instruments and wiring using RTU-9 and RTU-10. Modify OSDF leachate lift station and RTU-7 cabinets for wireless transmission. Relocate and connect well fiber optics converters to CAWWT control system. Relocate leachate control/monitoring functions to CAWWT control system.

22. Configure control program and operator interface graphics.

23. Rewire 277 volt power supply to indoor lighting. Rewire 120 volt power supply to control system, convenience outlets, outdoor lighting, etc. to be fed through CAWWT power supply.

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## SECTION 02222

### EXCAVATING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Removal of topsoil and subsoil, site excavating, and trenching.

##### 1.2 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

##### 3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify and flag known utility locations.
- C. Locate, identify, and protect utilities that remain from damage.
- D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

##### 3.2 EXCAVATION

- A. Excavate subsoil required to accommodate site structures and construction operations.
- B. Grade as required to minimize surface water run-on into excavation.
- C. Hand trim excavation. Remove loose matter.
- D. Remove lumped subsoil.

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- E. Notify the Construction Manager of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- F. Excavation crews shall be aware of the potential for cultural artifacts to be unearthed during any excavation work. Artifact discoveries shall be handled in accordance with site policy and procedure EP-0003, Unexpected Discovery of Cultural Resources, effective 2/10/95.
- G. Correct areas over-excavated in accordance with Section 02223.

### 3.3 TRENCHING

- A. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- B. Leave trench free of loose matter.
- C. Support pipe and conduit during placement and compaction of bedding material.

### 3.4 FIELD QUALITY CONTROL

- A. Provide for visual inspection of bearing surfaces.

### 3.5 PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

END OF SECTION

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## SECTION 02223

### BACKFILLING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Site filling and backfilling.
- B. Consolidation and compaction as scheduled.
- C. Fill for over-excavation.

##### 1.2 REFERENCES

- A. ODOT - Ohio Department of Transportation; Construction and Material Specifications.
- B. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- C. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.
- D. ANSI/ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- E. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

##### 1.3 SUBMITTALS

- A. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Fluor Fernald approval.
- B. Material Supplier shall provide to Fluor Fernald written certification that supplied materials meet specifications.
- C. Soil Testing: Soil testing shall be performed by a certified soil testing laboratory. Copies of lab and field tests made are to be provided to Fluor Fernald within 7 days after test.

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## **PART 2 PRODUCTS**

### **2.1 FILL MATERIALS**

- A. Structural Fill, Subsoil: Excavated and re-used material, free of lumps larger than 3 inches, rocks larger than 2 inches, topsoil and debris.
- B. Granular Base: ODOT Item 304.
- C. Granular Fill, General Pedestrian Area: Crushed limestone, 3/4" size.
- D. Fine Aggregate & Pipe Bedding: Fill sand, clean.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with granular fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

### **3.2 BACKFILLING**

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Backfill trenches to surrounding contours and elevations.
- C. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- D. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- E. Soil fill, structural: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- F. Soil Fill, Subsoil: Place and compact material in continuous layers not exceeding 12 inches compacted depth.



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- G. Employ a placement method that does not disturb or damage other work.
- H. Maintain optimum moisture content of backfill materials to attain required compaction density.
- I. Make gradual grade changes. Blend slope into level areas.
- J. Do not leave more than 100 feet of trench open at end of working day.
- K. Protect open trench and excavations to prevent danger to personnel.

### 3.3 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus 1/4 inch or minus 1/2 inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

### 3.4 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ANSI/ASTM D698, Standard Proctor. In-place testing to be performed in accordance with ANSI/ASTM D2922.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests (area backfill): One test per 1000 square feet per lift.
- D. Frequency of Tests (trenching): One test per 100 linear feet per lift.

### 3.5 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic.

### 3.6 SCHEDULE

- A. Trenching Under Pavement:
  - 1. Bedding: Fill sand, hand tamp around pipe. Compact to 95 percent of its maximum dry density.
  - 2. Base: ODOT Item 304, compacted to 95 percent Standard Proctor.

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B. Trenching in Unpaved Areas:

1. Bedding: Hand tamp around pipe. Compact to 80 percent of its maximum dry density.
2. Native subsoil or fill sand, to six (6) inches below finish grade, compacted to 80 percent Standard Proctor.
3. Native subsoil, flush to required elevation, compacted to 80 percent Standard Proctor.

C. General Site Fill:


1. Native subsoil, to contour elevations, compacted to 90 percent Standard Proctor.

D. Granular Pedestrian Area Fill:

1. 3/4 inch crushed limestone, 6 inches thick, no compaction requirement.

**END OF SECTION**

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## SECTION 02668

### SITE UNDERGROUND PIPELINES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Pipe and fittings for site underground lines including groundwater, stormwater, leachate and treated effluent.
- B. Valves and fittings.

##### 1.2 SUBMITTALS FOR REVIEW

- A. Product Data: Provide data on pipe materials, valves and accessories as directed.

##### 1.3 SUBMITTALS FOR CLOSEOUT

- A. Operation and Maintenance Data.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Record actual locations of piping mains, valves, connections, and invert elevations.
- D. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

##### 1.4 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Pipe: Plastics Pipe Institute – Polyethylene Joining Procedures

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Deliver and store valves fittings in shipping containers with labeling in place.

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## PART 2 PRODUCTS

### 2.1 WATER PIPE - UNDERGROUND

A. Polyethylene Pipe (HDPE): ASTM D3350, PE345434C and ASTM F714, SDR 11.

1. Fittings: ASTM D3261, butt fusion.
2. Joints: Butt fusion.
3. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering.

B. Carbon steel Double Wall Pipe.

1. Carrier Pipe: ASTM A53 GrB carbon steel, schedule 40, non-centered in containment pipe.
2. Containment Pipe: ASTM A53 GrB carbon steel, schedule 10 or schedule 40.
3. Fittings: Carrier pipe to be short radius ell; butt weld ASTM A-234. Containment pipe to be short radius ell, split along centerline and field welded to complete the assembly.
4. All buried carbon steel pipe to be wrapped with polyethylene pipeline coating tape, 40 mil thick, 4 inch tape width lapped 2 inches.
5. Joints: Butt Welded.
6. Flanges: Class 150 flat face with red rubber gasket.
7. Bolting: Bolts and nuts, ASTM A193 Grade B7/ASTM A194 Grade 2H.

### 2.2 PIPING COMPONENTS

- A. Post Indicator: McWane Type F-5760, size to correspond to pipe burial depth and valve size.
- B. Gate Valves: Clow Figure F-6202 resilient wedge, flanged, with 2 inch square operating unit.
- C. Check Valves: Clow Figure F-5380, horizontal swing check, flanged ends.
- D. HDPE Blind Flanges: ISCO or equal.

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- E. Transition Manhole: HDPE, ASTM D1248, 4 feet diameter x 4 feet deep, SDR 32.5 with 28 inch diameter access way and 1 ½ inch thick bolted watertight top. Manhole to have to plate for anchoring to concrete ballast. Complete assembly bg KWH pipe or equal.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions are as indicated on Drawings.

### 3.2 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

### 3.3 INSTALLATION - PIPE

- A. Group piping with other site piping work whenever practical.
- B. Install pipe to indicated elevation to within tolerance of one inch.
- C. Route pipe as indicated, following manufacturers recommendations for expansion allowance.
- D. Establish elevations of buried piping to ensure not less than 3 foot 6 inches of cover unless otherwise directed by Engineer.
- E. Install trace wire continuous over top of pipe. See Section 15190 for pipe identification.

### 3.5 INSTALLATION - VALVES AND HYDRANTS

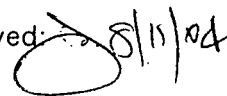
- A. Set valves on solid bearing.
- B. Center and plumb valve box or post indicator over valve. Set box cover flush with finished grade.

### 3.6 TESTING OF SYSTEMS

- A. Perform pipe pressure testing in accordance with ASME B31.3.
- B. Testing shall be performed prior to initial operation.
- C. Preparation for Testing
  - 1. All joints including fusion welds shall be left uninsulated and exposed for examination during the test.
  - 2. Provide temporary support and restraints as necessary for piping. For above-ground loose laid pipe tests, restrain pipe at ends and quarter lengths.
  - 3. Isolate equipment not subject to pressure test.
  - 4. If the test medium in the system is subject to thermal expansion, precautions shall be taken to avoid excess pressure.
- D. Hydrostatic Testing
  - 1. Test Medium: Water
  - 2. Vents: Provide air vents at high points of system to purge air pockets.
  - 3. Checks: Examine test equipment before pressure is applied for tightness and isolation of items that should not be subjected to test pressure.
  - 4. Examination for Leakage: After at least 20 minutes of applied test pressure, examine all joints, connections and regions of high stress for leaks.
  - 5. Test Pressure: Underground HDPE piping – 70 psig.
  - 6. Holding Time: 20 minutes plus time required for leakage examination.

**END OF SECTION**

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## SECTION 03001

### CONCRETE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Cast-in-place concrete.
- B. Equipment pads.
- C. Formwork, shoring, bracing, and anchorage.
- D. Concrete reinforcement and accessories.

##### 1.2 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.

##### 1.3 SUBMITTALS

- A. Product Data: Provide data on joint devices, grout, attachment accessories, and admixtures.
- B. Submit shop drawings of reinforced steel. Indicate reinforcement sizes, spacings, locations, and quantities of reinforcing steel.
- C. Mix design shall be a FEMP Standard Batch Mix

##### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Take cylinders and perform slump and air entrainment tests in accordance with ACI 301.

#### PART 2 PRODUCTS

##### 2.1 FORM MATERIALS

- A. Conform to ACI 301.

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## 2.2 REINFORCING STEEL

- A. Reinforcing Steel: ASTM A615, 60 yield grade billet steel deformed bars; uncoated finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A185; uncoated finish. Use flat sheets, not rolls.

## 2.3 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and not detrimental to concrete.

## 2.4 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Calcium Chloride: Not Permitted.
- C. Chemical: ASTM C494 Type A - Water Reducing, Type B - Retarding, Type C - Accelerating, Type D - Water Reducing and Retarding, Type E - Water Reducing and Accelerating.

## 2.5 ACCESSORIES

- A. Bonding Agent: Weld-Crete by Larson Products or approved equal.
- B. Vapor Barrier: 6 mil thick clear polyethylene film.
- C. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 7,000 psi in 28 days.
- D. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.
- E. Tie Wire: No. 16 AWG black annealed or heavier.
- F. Anchor Bolts: Carbon steel material conforming to ASTM A36, national course threaded.



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- G. Embedded Metal: All embedded metal shall have suitable anchors securely welded on centers not exceeding 2 feet. Anchors shall be within 6 inches of ends and corners. All joints, corners, splices, etc. shall be welded and exposed surfaces ground flush. Metal surfaces shall be free of rust, oil, or other contaminants. Surfaces not intended for contact with concrete shall be coated with inorganic zinc primer or approved equal.

## 2.6 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A ASTM D1751 Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile.
- B. Joint Filler Type B ASTM D1752; Closed cell polyvinyl chloride foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.
- C. Joint Sealant: Single -part polyurethane, gray color.
- D. Waterstops: PVC, 6", serrated with center bulb type, heat sealed joints.

## 2.7 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. **Structural and Exterior Slab on Fill Concrete Exposed to Weather (FMPC #4):**

Compressive Strength (28 day):	4000 psi
Water/Cement Ratio (maximum):	0.45
Aggregate Size (maximum):	1 inch
Slump:	4 inch, plus or minus 1 inch
Minimum Cement Content:	564 lbs. per cu. yd.
Flyash (maximum):	Not permitted.
Total Air Content:	5% plus or minus 1.5%

- C. **Sidewalk, Service Pads and Miscellaneous Concrete Exposed to Weather:**

Compressive Strength (28 day)	3000 psi
Water/Cement Ratio (maximum)	0.45
Aggregate Size (maximum)	1 inch
Slump:	4 inch, plus or minus 1 inches
Minimum Cement Content:	517 lbs. per cu. yd.
Flyash (maximum):	77 lbs. per cu. yd.
Total Air Content:	5% plus or minus 1.5%

- D. Use accelerating admixtures in cold weather only when approved by Fluor Fernald. Use of admixtures will not relax cold weather placement requirements.

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- E. Use set retarding admixtures during hot weather only when approved by Fluor Fernald.
- F. Fly ash concrete is not recommended for cold weather concreting or where high early strength is required.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- C. Verify form joints are aligned.

#### 3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete and insert steel dowels.

#### 3.3 PAVEMENT REPAIRS

- A. Existing roadway pavements to be repaired shall be sawed full depth.
- B. Disturbed base and/or subgrade material shall be recompact.

#### 3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify Fluor Fernald a minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

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- D. Sidewalks: Place sidewalk on 2 inch thick compacted sand base. Sidewalks to be 4 inches thick unless noted otherwise. All exposed edges and joints shall be edged with a ¼ inch radius tool. The surface shall be divided into equally spaced blocks at approximately 5 foot intervals. A ½ inch expansion joint filler shall be installed between the walk and any fixed structure, extended the full depth of the walk.
- E. Install joint devices in accordance with manufacturer's instructions.
- F. Install joint device anchors. Maintain correct position to allow joint cover to be flush.
- G. Apply sealants in joint devices.
- H. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- I. Place concrete continuously between predetermined expansion, control, and construction joints.
- J. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into ¼ depth of slab thickness.
- K. Screed floors and slabs on grade level. Maintain Class B tolerance according to ACI 301.

### 3.5 CONCRETE FINISHING

- A. Rough form finish for concrete surfaces not exposed to public view.
- B. Cement slurry form finish for concrete surfaces exposed to public view.
- C. Wood float finish for sidewalks.
- D. Finish concrete floor surfaces in accordance with ACI 301.

### 3.6 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Cure floor surfaces in accordance with ACI 301.

### 3.7 SEALANTS

- A. Seal edges between new and existing pavement.

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**3.8 FIELD QUALITY CONTROL**

A. Field inspection and testing will be performed in accordance with ACI 301.

**3.9 PATCHING**

A. Excessive honeycomb or embedded debris in concrete is not acceptable.

B. Patch imperfections in accordance with ACI 301.

C. Repair or replacement of defective concrete will be determined by the Construction Manager.

**END OF SECTION**

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Approved:  8/11/04**SECTION 05500****METAL FABRICATIONS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Shop fabricated ferrous metal items, galvanized and prime painted.
- B. Formed metal floor and stair tread grating.
- C. Handrails and stair stringers.
- D. Pipe supports.

**1.2 REFERENCES**

- A. AWS A2.4 - Symbols for Welding, Brazing, and Nondestructive Examination.
- B. AWS D1.1 - Structural Welding Code.
- C. NAAMM MBG 531 - Metal Bar Grating Manual.
- D. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual.
- E. SSPC - Steel Structures Painting Council.

**1.3 SUBMITTALS**

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- B. Product Data: Provide span and deflection tables for grating.
- C. Manufacturer's Installation Instructions (Grating): Indicate special requirements of perimeter framing.
- D. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

#### 1.4 QUALIFICATIONS

- A. Welders Certificates: Certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

#### 1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Drawings or shop drawings.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B.
- C. Plates: ASTM A283 or ASTM A36.
- D. Pipe: ASTM A53, Grade B, Schedule 40.
- E. Steel Grating: Welded construction, rectangular shape bearing bars with serrated top surface spaced 1 3/16" on centers, cross bars 4" on centers, galvanized. Perimeter closure (banding) of same material as grating.
- F. Structural Fasteners: ASTM A325.
- G. Accessory Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.
- H. Saddle Clips, Flange Blocks and J-Hooks: Galvanized steel.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. Shop and Touch-Up Primer: Short-oil alkyd primer, VOC compliant, one coat at 2 mils dry film thickness. Carboline GP818 or equal.
- K. Touch-Up Primer for Galvanized Surfaces: Chlorinated rubber, zinc-rich coating, one coat at 5 mils dry film thickness. Carboline Galvanox Type I or equal.

#### 2.2 FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.

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- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Fabricate grates and plates to sizes indicated.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

- A. Prepare surfaces to be primed in accordance with SSPC SP-6.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Galvanizing, Structural Shapes and Plates: Conform to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.
- D. Galvanizing, Assembled Items: Minimum 1.25 oz/sq ft zinc coating in accordance with ASTM A386.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections.

3.2 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

- C. Mechanically cut galvanized finish surfaces. Do not flame cut.
- D. Anchor grating by bolting through saddle clips.
- E. Secure flooring to prevent movement.
- F. Field weld components indicated on Drawings.
- G. Perform field welding in accordance with AWS D1.1.
- H. Obtain Fluor Fernald approval prior to site cutting or making adjustments not scheduled.
- I. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

### **3.3 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Grating: Conform to NAAMM MBG 531: Maximum spacing between adjacent sections to be 1/4 inch.

**END OF SECTION**



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## SECTION 09900

### PAINTING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Surface preparation and field application of paints and coatings.

##### 1.2 REFERENCES

- A. ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. NPCA (National Paint and Coatings Association) - Guide to U.S. Government Paint Specifications.
- C. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.
- D. OSHA (Occupational Safety and Health Administration) - 29 CFR 1910

##### 1.3 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this Section.

##### 1.4 SUBMITTALS

- A. Product Data: Provide data on all finishing products and special coatings.
- B. Manufacturer's Instructions: Indicate special surface preparation procedures, substrate conditions requiring special attention.
- C. Material Safety Data Sheet (MSDS): Submit for primers, finish paints, thinners and solvents.

##### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- B. Applicator: Company specializing in performing the work of this section with a minimum of three years experience.

Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
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## 1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame and smoke rating requirements for finishes.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F in ventilated area, and as required by manufacturer's instructions.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- C. Noise, dust, fumes and fire hazard due to painting and sandblasting shall comply with OSHA 29 CFR 1910 regulations.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

#### A. Manufacturers - Paint

1. Carboline
2. Coronada
3. Glidden
4. Approved equal.

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## 2.2 MATERIALS - GENERAL

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- C. Materials shall be free of lead and other RCRA metals.

## 2.3 FINISHES

- A. Refer to schedule at end of section for surface finish and color schedule.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop applied primer for compatibility with subsequent cover materials.

## 3.2 PREPARATION

- A. Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.
- C. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- D. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool cleaning, SSPC-SP3 or commercial blast cleaning, SSPC-SP6. Spot prime paint after repairs.

- E. Shop Primed Steel Surfaces: Power tool clean per SSPC-SP3 to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Prime bare steel surfaces.

### 3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Allow applied coat to dry before next coat is applied.

### 3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Prime and paint exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports except where items are prefinished.
- D. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- E. Color code equipment, ferrous piping, conduit, and exposed duct work in accordance with color schedule.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### 3.5 CLEANING

- A. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove from site.

### 3.6 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

- A. Structural Steel.
- B. Metal Fabrications.

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### 3.7 SCHEDULE - SURFACES

#### A. New Steel:

1. One coat at 2 mils of a VOC compliant, short-oil alkyd primer. Carboline GP818 or equal.
2. Two coats at 3 mils of a water-borne acrylic, semi-gloss. Carboline D3359 or equal.

#### B. Non-Insulated Piping, Black:

1. One coat at 3 mils dry film thickness of a VOC compliant, inorganic zinc primer. Carboline Carbo Zinc 11HS or equal.
2. Field touch-up with high build epoxy mastic. Carboline Carbomastic 15 or equal.
3. Finish: One coat at 6 mils dry film thickness of a VOC compliant, cross-linked epoxy, semi-gloss. Carboline 801 or equal.

#### C. Existing Steel Touch-Up Coating:

1. Field touch-up with high build epoxy mastic. Carboline Carbomastic 15 or equal.

### 3.8 SCHEDULE - COLORS

#### A. Structural Steel, Equipment and Tanks (atmospheric): Light Gray; Fed. #16492

#### B. Miscellaneous Steel: Match surrounding area.

#### C. Handrails, Safety Ladders and Bollards: Safety Yellow; Fed. #38907

#### D. Piping Systems

1. Non-Hazardous Liquids: Green; Fed. #14187
2. Non-Hazardous Gases: Blue; Fed. #15182
3. Flammable, Explosive, and Extreme Pressure: Yellow; Fed. #13655
4. Chemically Active, Toxic, and Radioactive: Yellow; Fed. #13655
5. Fire Protection: Red; Fed. #11105

**END OF SECTION**

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**Date: 8-12-04**

**Section 13400**

**Rev. 0**

Approved: 

## **SECTION 13400**

### **PROCESS INSTRUMENTATION**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Installation of equipment and pipeline mounted instruments to include the following:
  - 1. Pressure Gages
  - 2. Flow Transmitters
  - 3. Flow Valves
  - 4. Level Control Valves
  - 5. Level Transmitters and Switches
  - 6. Solenoid Valves
- B. The process instrument design is being performed by Dublin Technical and Procurement of Instrument Components will be a joint effort of that Subcontractor and Fluor Fernald.
- C. Receive, store and install instruments in accordance with the following articles.

##### **1.2 ACCEPTANCE**

- A. Products arriving at the FEMP will be examined by QA and Receiving. Products found to be damaged shall not be accepted.
- B. Store instruments in a clean, dry area.

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS**

- A. Provide miscellaneous materials such as thread sealant, tubing, pipe nipples and brass fittings as required for instrument installation.

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## PART 3 EXECUTION

### 3.1 GENERAL

- A. Instruments shall be located in piping with respect to other devices as shown on the P&ID's.

Where there is any question as to the appropriate instrument location install as directed.

- B. Instrument sensing lines shall be supported for a rigid installation and routed to avoid any traps in tubing.
- C. Drains and blowdowns shall be located so they are accessible to operating personnel.
- D. Where possible hand valve levers or handwheels shall be accessible and convenient to lockout.
- E. All instruments shall have identification corresponding to P&ID nomenclature.
- F. Instrument air and pneumatic signal tubing shall be copper, ASTM B68 or ASTM B75, 3/8 inch diameter, except headers serving multiple instruments shall be rigid A53 carbon steel, schedule 40, plain, 1/2" or 3/4" size.
- G. Instrument impulse tubing shall be stainless steel, ASTM A269, 1/2 inch OD by 0.035 inch wall.
- H. Fittings, except as otherwise required, shall be compression type.

**END OF SECTION**

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Approved: 

## SECTION 15060

### PIPE, FITTINGS, VALVES, AND ACCESSORIES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Pipe.
- B. Fabricated piping assemblies.
- C. Fittings.
- D. Valves.
- E. Specialty items.

##### 1.2 RELATED SECTIONS

- A. Section 09900 – Painting.
- B. Section 15140 – Piping Supports and Anchors.
- C. Section 15260 – Insulation.

##### 1.3 REFERENCE, CODES, AND STANDARDS

- A. American Society of Mechanical Engineers-(ASME):
  - 1. ASME A13.1 Scheme for the Identification of Piping Systems (R1993).
  - 2. ASME B16.25 Buttwelding Ends.
  - 3. ASME B31.3 Chemical Plant and Petroleum Refinery Piping.
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.
  - 2. ASTM A126 Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.



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3. ASTM A194 Standard Specification for Carbon and Alloy Steel nuts for Bolts for High-Pressure and High-Temperature Service.

4. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

C. American Welding Society (AWS):

1. AWS A5.1-91 Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.

#### 1.4 SUBMITTALS

A. Product data for, valves and accessories as directed.

B. Installation, maintenance, and operation instruction manuals, as appropriate.

C. Welder, procedure, and examiner qualifications, qualification records, and welding procedure specifications.

#### 1.5 QUALITY ASSURANCE PROGRAM

A. Except where more stringent requirements are specified or indicated, the work specified herein shall conform to ASME 31.3

B. Welding Procedures and Qualifications

1. Fabrication, assembly, and erection shall be in accordance with ASME B31.3.

C. Testing

1. Testing shall be in accordance with ASME B31.3, in service tests.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging

1. Materials shall be cleaned to remove chips, slag, weld spatter, oil, grease, debris, and other foreign material prior to packaging for shipment. All openings shall be covered, capped, or plugged shipment and storage.

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#### B. Storage and Handling

1. Piping materials and prefabricated assemblies shall be stored off the ground and handled with care so that physical damage to the piping materials does not occur. End seals of pipe, flange covers, valve covers, and similar protection shall not be removed until necessary for cleaning, fabrication inspection, and erection.
2. Care shall be taken in the storage and handling of all piping materials and prefabricated assemblies so that contamination or corrosion does not occur.
3. Welding rods and electrodes shall be stored, handled, and identified at all times to ensure the use of the proper welding rod.

## PART 2 PRODUCTS

### 2.1 PRODUCTS/EQUIPMENT

#### A. Piping and Valve Specification

1. All piping materials, valves, and valve operators shall meet the requirements of the referenced specification as indicated on the piping material data sheets in Attachment A. All material shall be of domestic manufacture.
2. All valves shall be inherently capable of accepting a lock without use of extra equipment or devices.
3. Provide handwheel extensions or chain operators for valves not accessible from floor or platforms.

#### B. Basket Strainer

1. Types: Hayward Model 50, Double basket with integral diverting valves.
2. Construction:
  - a. Body: Ductile iron or cast iron.
  - b. Connections: Class 125 flanged, flat face.
  - c. Baskets: Perforated Type 316 stainless steel.
  - d. Basket Media:
    - 1) 1/8-inch perforated.
  - e. Basket Covers: Quick opening, hinged type.
  - f. Rated Pressure: 200 psig at 100 degrees F.

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3. Diverter Valves: Synchronized steel butterfly type with a single handwheel operator.
4. Ventvalves, drain valves, pressure differential gage and switch connection.

## 2.2 LABELING

### A. Valve Identification

1. Each valve shall be identified with unique valve number and description, as shown on the Piping and Instrumentation Diagrams. All field run valving not shown on the Piping and Instrumentation Diagrams shall also be labeled in a similar manner.
2. Valve identification tags on insulated valves shall be located outside the insulation jacketing and be easily accessible for inspection.

### B. Pipe Identification

1. Identify the flow medium and the flow direction for all piping systems including insulated pipe by labeling adjacent to each valve, adjacent to where the pipe passes through a wall or floor, adjacent to abrupt pipe directional change, and at intervals of 50 feet along exposed pipe. Pipes shall be labeled as indicated on the Piping and Instrumentation Diagrams and in accordance with ASME A13.1.

## PART 3 EXECUTION

### 3.1 ERECTION/INSTALLATION/APPLICATION

#### A. Layout, Cutting, and Fitting Up

1. Piping 2 inches in diameter and smaller shall be field routed and supported
2. All piping shall be normal fluid service under ASME B31.3.
3. All assembled piping shall be installed without springing, forcing, or cold bending. Cutting or otherwise weakening of structural members to facilitate piping installation shall not be permitted.
4. All piping shall be installed to permit free expansion and contraction without damage to joints or supports.

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5. Piping connections to equipment must ensure that mating flanges are parallel prior to bolt-up. Springing of pipe is not acceptable. All equipment nozzle sizes, locations, and flange facings shall be verified prior to pipe fabrication and/or installation.
6. Piping arrangement shall allow easy access for maintenance, operation, and inspection of equipment. Flanges, unions, and valves shall be accessible for maintenance, operation, and inspection after installation. Piping shall be made to protect against a tripping hazard.
7. Penetration, and flashing shall be provided as required. Flashing shall be placed around both sides of wall penetrating pipe.
8. Threading of steel pipe shall be done preferably after bending, forging, heat treating, or welding operations. Where subsequent threading is very difficult and treads are cut first, they shall be fully protected during the above-mentioned operations. Threads shall be concentric with the outside of the pipe.
9. Pipe dope shall be applied to male treads only. Teflon tape, when used as thread dope, shall not be applied to the first two threads.
10. Branch connections shall not intersect the longitudinal seam of Electric Resistance Weld headers.

**B. Welding.**

1. All welding electrodes shall be in accordance with AWS A5.1.

**C. Flanged Joints**

1. The mating surfaces of the flanges shall be in a plane that is perpendicular to the axis of the pipe. Flanges shall be rotated so that the bolt holes straddle the vertical flange centerline. All gaskets shall be evenly centered between the flange faces. Flanges shall mate flush and the bolts shall be tightened uniformly to draw the flanges evenly and firmly upon the gasket. Bolts shall be torqued within the flange manufacture's recommended range and tightening sequence.
2. All flanged joints shall be made with new gasket and bolting materials. Bolts and nuts damaged during installation shall be replaced.

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3. Class 150 or class 300 steel flanges shall be bolted to flanged cast iron valves, fittings, or equipment having integral Class 125 or Class 250 flanges, respectively. When such construction is used, flat-face steel flanges shall be used with a full-face gasket.
4. Provide ASTM A307 Grade B cap screws for bolting flanges to lug type Butterfly valves or equivalent.

### 3.2 QUALITY CONTROL

#### A. Inspections and Tests

1. Piping shall be visual leak checked with service medium at normal operating pressure.
2. All connections/joints (including welds) shall be left uninsulated and exposed for examination for leakage during testing.

5000

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#### APPENDICES TO SECTION 15060

A – PIPING MATERIAL SPECIFICATIONS

B – PIPING ISOMETRICS

C – TANK NOZZLE DRAWINGS

D – TIE-POINT LIST

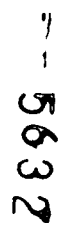
E – NEW PIPE LINE LIST

F – NEW VALVE LIST

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## APPENDIX A – PIPING MATERIAL SPECIFICATIONS

TANK-345

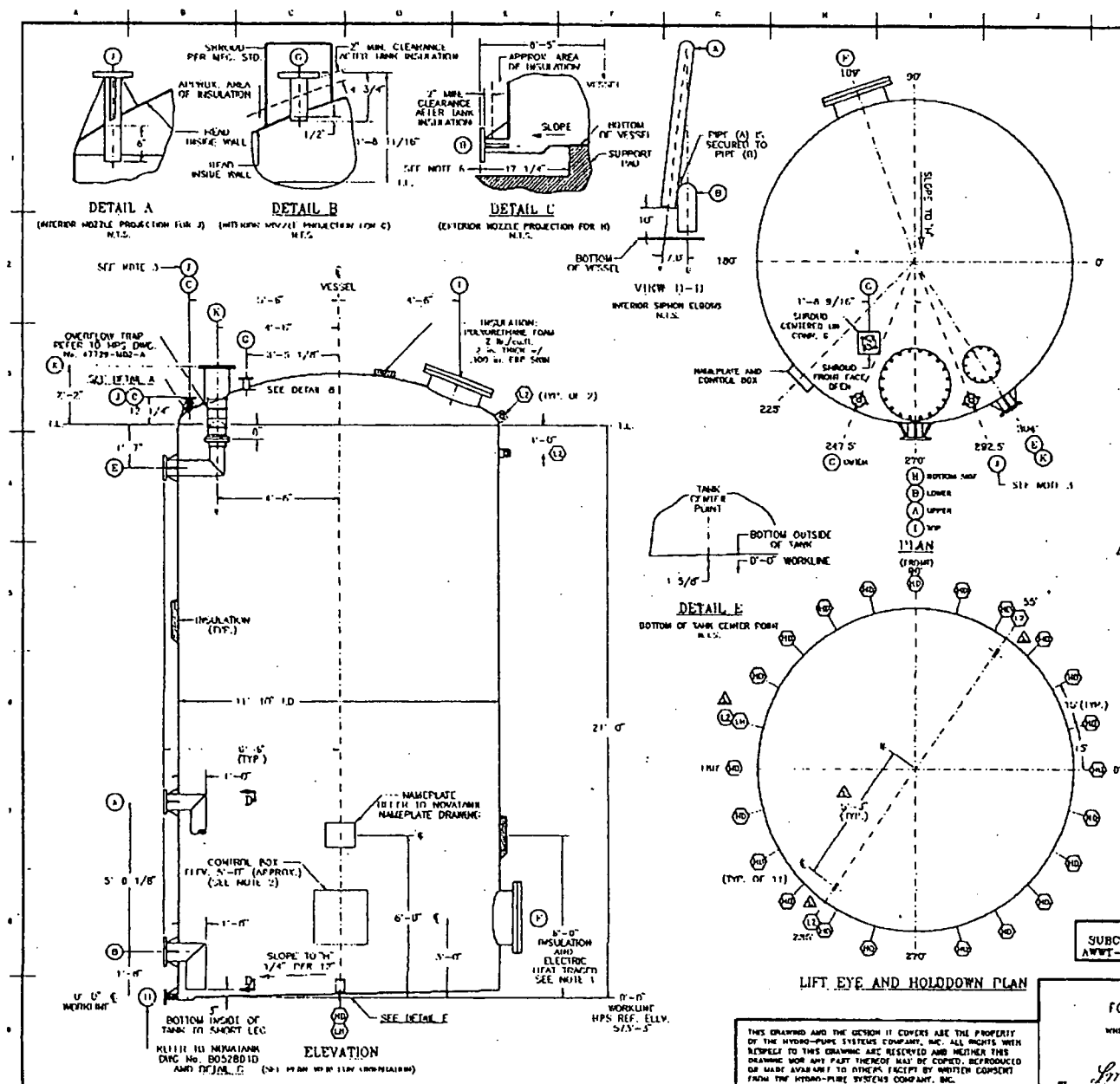




E - OVERFLOW TRAP  
 A - STORMWATER INLET  
 B - BLIND FLANGE  
 H - PROGRESSIVE C/W. PUMPS  
 G - LIT-BAX

I - MAN-LEACH.

11-24-93



QUANTITY: 6	
EQUIPMENT MOD:	
51-1220-TNK	51-2343-TNK
51-1221-TNK	51-2344-TNK
51-1222-TNK	51-2345-TNK

DESIGN CONDITIONS			
SERVICE:	SULPHURIC ACID	TEMP:	200 F
PRESSURE:	0.25 psig + STATED HEAD		
CAPACITY:	18000 GAL MIN	SPEC. GRAV:	1.1 CONC. 18%
DIAMETER:	11'-10" I.D.	HEIGHT:	21 FT. S.S.
BOTTOM:	SLOPED	LINER:	LEAD 451 +/- 0.018
STRUCTURE:	C-GLASS	STANDARD:	ASTM D3286
SURFACE:	2 in POLYURETHANE INSUL W/ 0.100 in FIB ANCRET		
THICKNESS:	0.706 in. CYL. BASE: 0.531 in. TOP: 0.375 in. BOTTOM		

CONNECTION SCHEDULE	
NO.	DESCRIPTION
A	FLANGED & GUSSETED NOZZLE, F.F. 150'
B	W/ W/ELDON 45' ELBOW
C	FLANGED & GUSSETED NOZZLE, F.F. 150'
D	W/ W/ELDON 45' ELBOW
E	FLANGED & GUSSETED NOZZLE, F.F. 150'
F	W/ W/ELDON 45' ELBOW
G	FLANGED & GUSSETED NOZZLE, F.F. 150'
H	W/ W/ELDON 45' ELBOW
I	FLANGED & GUSSETED NOZZLE, F.F. 150'
J	W/ W/ELDON 45' ELBOW
K	FLANGED & GUSSETED NOZZLE, F.F. 150'
L	W/ W/ELDON 45' ELBOW

ACCESSORY SCHEDULE	
NO.	DESCRIPTION
1	CORROSION PROTECTANT
2	WELD METAL
3	WELD METAL
4	WELD METAL

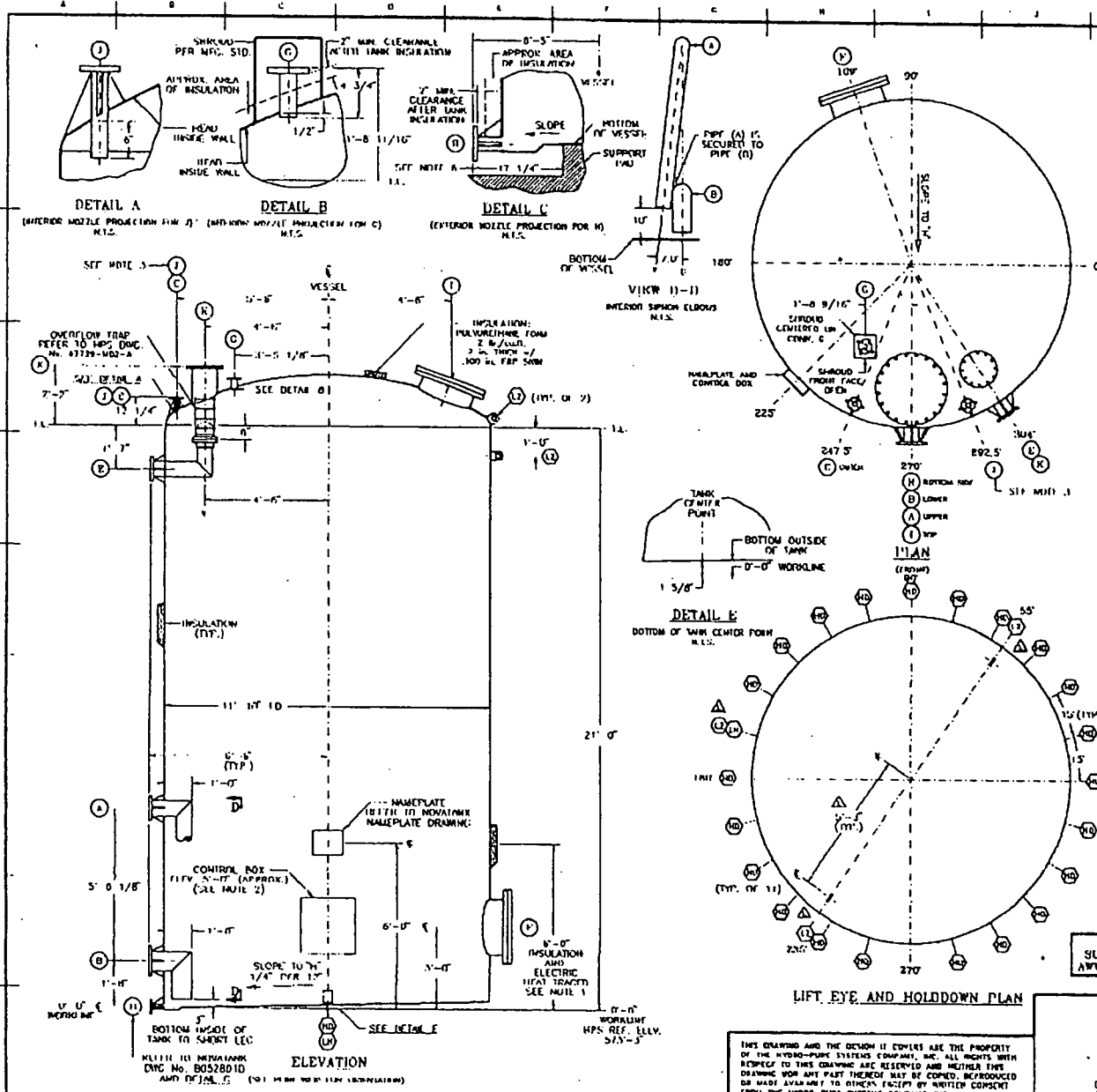
NOTES	
1.	LOWER 6" OF VESSEL WALL BE EFFECTIVELY HEAT TRACED AND INSULATED. BALANCE OF VESSEL SHALL BE INSULATED.
2.	HEATING SYSTEM (211) REGULATING VALVE, REFER TO: NOVATANK DRAWING D052801C COOPERATED DRAWING SK-D4049
3.	CONNECTION J (CHEMICAL P.L.C.) IS 141.5 IN. DIA. ON F.W. TWO OF SIX VESSELS (51-1222-TNK & 51-2345-TNK)
4.	HYDRO-PURE SPECIFICATION SHEET, No. 47729-B02 IS AN INTEGRAL PART OF THIS DRAWING
5.	DRILL HOLES STRADDLE THE 0' 100' AND/OR VEHICLE-CENTER LINE
6.	ACTUAL SUPPORT AND LIFT-OUT DIMENSIONS THIS DIMENSION OVERRIDES DIMENSIONS ON NOVATANK DRAWING D052801B

HYDRO-PURE SYSTEMS COMPANY INC.	
477 ST. N. MINNEAPOLIS, MN 55412	TEL: 612-337-1212 FAX: 612-337-1213
SCALE: 1/4" = 1'-0"	APPROVAL: J.C.G. 06/03
DATE: 4-8-93	DESIGN: J.C.G.
TITLE: VESSEL DETAIL: RECYCLE TANKS	
DRAWING NO. 47729-B02-B	

D - FURN. SUCCTION  
 H - PROGRESSIVE CAV. PUMPS  
 E - OVERFLOW  
 C - P CAV. DISCH.  
 G - LIT-515  
 K - VENT-B"

# MANHOLE - BACKWASH DISCH. TANK 221



QUANTITY: 6	
EQUIPMENT NOS:	
51-221-TNK	51-221-TNK
51-222-TNK	51-222-TNK
51-223-TNK	51-223-TNK

DESIGN CONDITIONS			
SERVICE:	SULFURIC ACID	TEMP.:	200 F
PRESSURE:	8.25 psig + STATIC HEAD		
CAPACITY:	18000 gal. MIN. SPEC. GRAV.: 1.1	CONC.:	10%
DIAMETER:	11'-10" O.D.	HEIGHT:	21 FT. S.S.
BOTTOM:	SLOPED	LINE:	TEMP. 411 W/ C. V.L.
STRUCTURE:	C-GLASS	STANDARD:	ASTM D3289
SURFACE:	2 in. POLYURETHANE INSUL. w/ 0.100 in. 1/2\"		
THICKNESS:	0.756 in. CYL. BASE: 0.531 in. TOP: 0.375 in. BOTTOM		

CONNECTION SCHEDULE		
NO.	SIZE	FUNCTION
A	6"	FLANGED & CUSSETED NOZZLE, F.F. 150# W/ INTERIOR 45° ELBOW
D	8"	PUMP SECTION FLANGED & CUSSETED NOZZLE, F.F. 150# W/ PUMP
C	2"	VENT FLANGED & CUSSETED NOZZLE, F.F. 150#
E	6"	OVER FLOW FLANGED & CUSSETED NOZZLE, F.F. 150#
F	24"	MANHOLE MANUFACTURER'S STANDARD FOR DESIGN CONNECTION
G	5"	LEVEL FLANGED NOZZLE, F.F. 150# 2\"
H	2"	DRUM FLANGED & CUSSETED NOZZLE, F.F. 150#
I	24"	MANHOLE MANUFACTURER'S STANDARD FOR DESIGN CONNECTION
J	1-1/2"	CHEMICAL FILL FLANGED & CUSSETED, F.F. 150#
K	10"	TRAP ACCESS MANUFACTURER'S STANDARD PIPE (10\"

ACCESSORY SCHEDULE		
SYMBOL	QUANTITY	DESCRIPTION
HD	11	CARBON STEEL HOLD DOWN BRACKET
L2	3	CARBON STEEL LIFT F.YE; TYPE, No. 2
LM	1	CARBON STEEL CEMENTED HD 10\"

1. LOWER 6\" OF VESSEL WALL BE EFFECTIVELY HEAT TRACED AND INSULATED. BALANCE OF VESSEL SHALL BE INSULATED.  
 2. HEATING SYSTEM: 3011 INSULATION CABLE, REFER TO: NOVATANK DRAWING D0528010 COOPER/CAT DRAWING SK-D4049  
 3. CONNECTION J (CHEMICAL FILL) IS: 1/2\" ON TANK TWO OF SIX VESSELS (51-222-TNK & 51-223-TNK)  
 4. HYDRO-PURE SPECIFICATION SHEET No. 47720 B02 IS AN INTEGRAL PART OF THIS DRAWING.  
 5. ONLY HOLES STRADDLE THE 0 100\" AND/OR VERTICAL CENTER LINE.  
 6. ACTUAL SUPPORT AND LIFT DIMENSIONS THIS DRAWING OVERIDES DIMENSIONS ON NOVATANK DRAWING D0528010.

NO.	DATE	DESCRIPTION
1	6-21-94	CHANGED LIFT EYE CONFG.
2	1-27-94	CHANGED HOLDDOWN CONFG.; OTHERS
3	2-18-94	ADDED INST. SHROUD ON CONN. C
4	3-20-94	CHANGED CONNECTION J
5	12-13-93	ADJUSTED CONNECTIONS A & E
6	12-7-93	CHANGED VESSEL STYF; DIMENS
7	11-8-93	ADJUST OVERFLOW TRAP ELEVATION
8	10-26-93	FABRICATION RELEASE
9	10-4-93	CFC: HEATING SYSTEM
10	9-30-93	CFC
11	8-10-93	CHANGED CONNECTIONS A AND I
12	8-4-93	RECURRENT CONNECTIONS; OTHERS

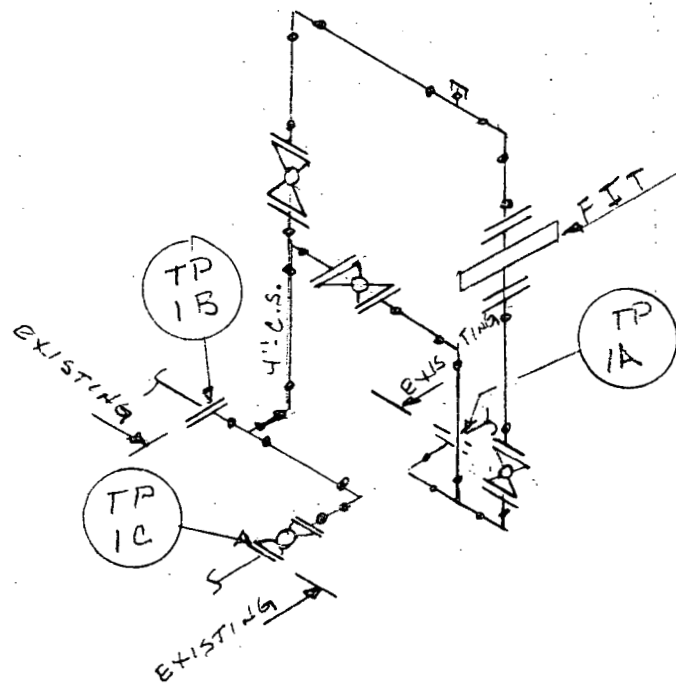
HYDRO-PURE SYSTEMS COMPANY, INC.	
187 ST. 14, BOSTON, MASS 02111	201-877-1515 - (FAX) 201-877-1513

SCALE: 1/4\"	DATE: 4-8-93	APPROVAL: D.C.G. 8/8/93	OF: 48
		UNLESS	DRAWN: PD
TITLE: VESSEL, DIAL: RECYCLE TANKS			
DRAWING NO. 47720 B02			

5632

# LEACHATE & BACKWASH TIE-IN TO SWRB IN MANHOLE #412



## BILL OF MATERIAL

- 1) 20' - 4" P.P.E, STEEL, SCH. 40
- 2) 7 - 4" 90°, " " " B.W.E
- 3) 4 - 4" TEES " " " "
- 4) 1 - 4" CAP " " " "
- 5) 11 - 4" FLANGES, STEEL, #150, S.O. RF
- 6) 12 - 4" GASKETS, #150, RED RUBBER RING TYPE
- 7) 4 - 4" BALL VALVES
- 8) 1 - 4" FIT
- 9) 24 -  $\frac{5}{8}$ " x  $\frac{1}{4}$ " STUDS, B-7
- 10) 200 -  $\frac{5}{8}$ " NUTS, HEAVY HEX, 2-H
- 11) 72 -  $\frac{5}{8}$ " x  $\frac{3}{4}$ " STUDS, B-7

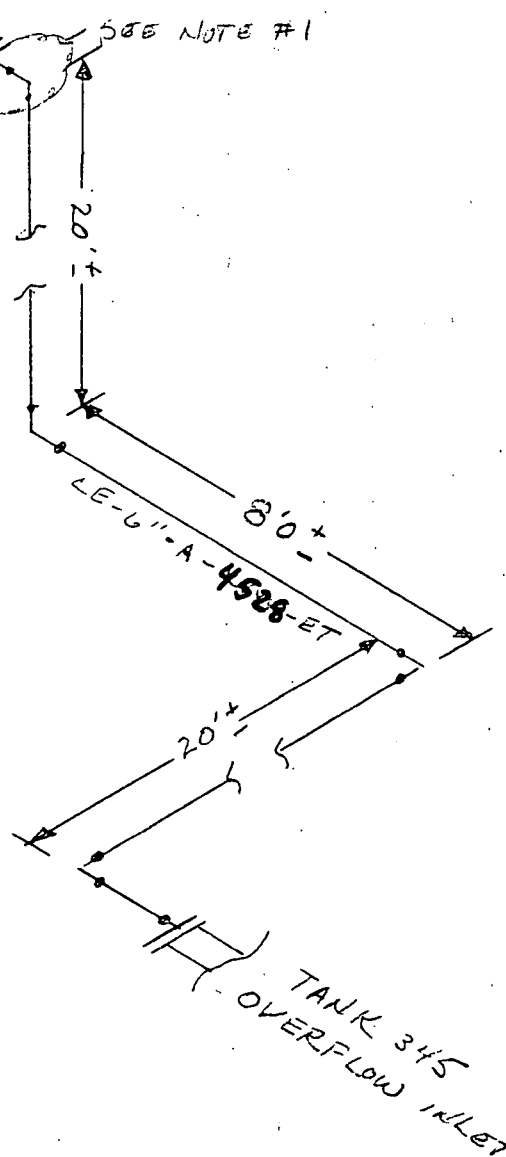
SK-ISO-Ø14

Sh. 1 8-10-04

# TANK 344 OVERFLOW TO TANK 345

TANK 344  
OVERFLOW

SEE NOTE #1



## BILL OF MATERIAL

- 1) 60'-6" P.A.S, STEEL, SCH. 40, W.N, BWE
- 2) 3-6" 90°, " " " "
- 3) 2-6" FLANGES, " 150#, W.N, FF
- 4) 2-6" GASKETS, R.R. 1/8" THICK, FF
- 5) 16-3/4" X 4" STUDS, B-7
- 6) 32-3/4" NUTS, 2-H
- 7) 1-6" 90°, STEEL, SHORT RADIUS, SCH. 40, BWE
- 8) 1-6" FLANGES, STEEL, 150#, S.O. FF

## NOTES

- 1) USE 6" SLIP-ON FLANGES WITH 6" SHORT RADIUS 90°

# NOTES

- 1) CLOUDY AREA PIPING WILL BE REUSED ALONG WITH PUMPS.
- 2) REMOVE PSV DISCHARGE PIPING FROM SUCTION LINE OF PUMPS & PLUG.
- 3) FIELD ROUTE PIPING TO BACKWASH SURGE TANK 221.

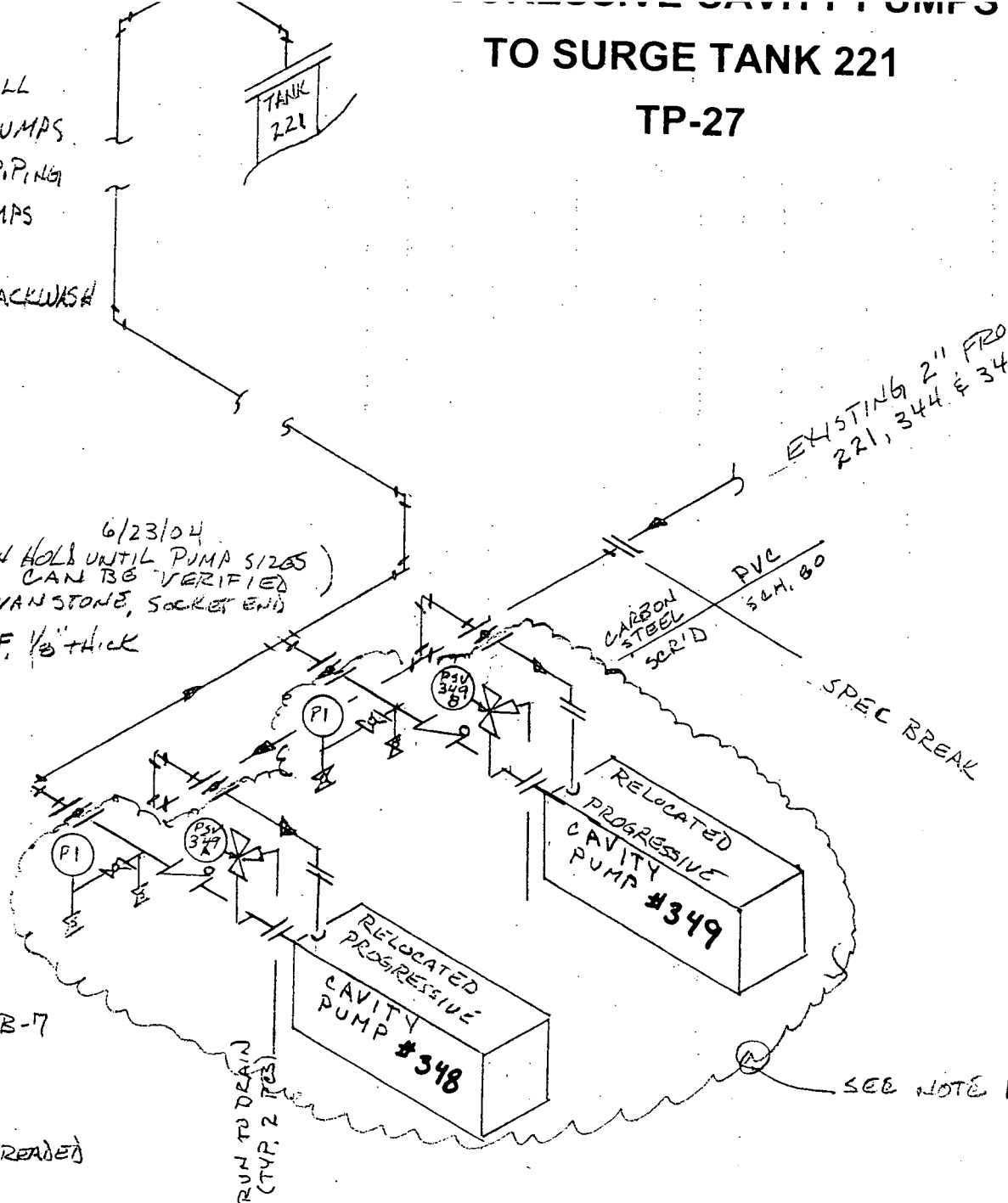
## TO SURGE TANK 221 TP-27

2033

EXISTING 2" FROM TANKS  
221, 344 & 345

### BILL OF MATERIAL (ON HOLD UNTIL PUMP SIZES CAN BE VERIFIED)

- 1) 1-2" PVC FLANGE, SCH. 80, VANSTONE, SOCKET END
- 2) 1-2" GASKET, RED RUBBER, FF, 1/8" THICK
- 3) 4-5/8 x 3/4" STUDS, B-7
- 4) 8-5/8" NUTS, 2-H
- 5) 6-2" FLANGE, CLASS 150, CARBON STEEL, FF, THREADED
- 6) 2-2" TEE, 3000#, C.I.S., THREADED
- 7) 10-2" 90° DITTO ITEM #6"
- 8) 4-2" BUTTERFLY VALVES
- 9) 16-5/8 x ? STUDS FOR B.V., B-7
- 10) 8-5/8 x 3/4" STUDS, B-7
- 11) 43-5/8" NUTS, 2-H
- 12) 60'-2" PIPE, C.I.S., SCH 40, THREADED

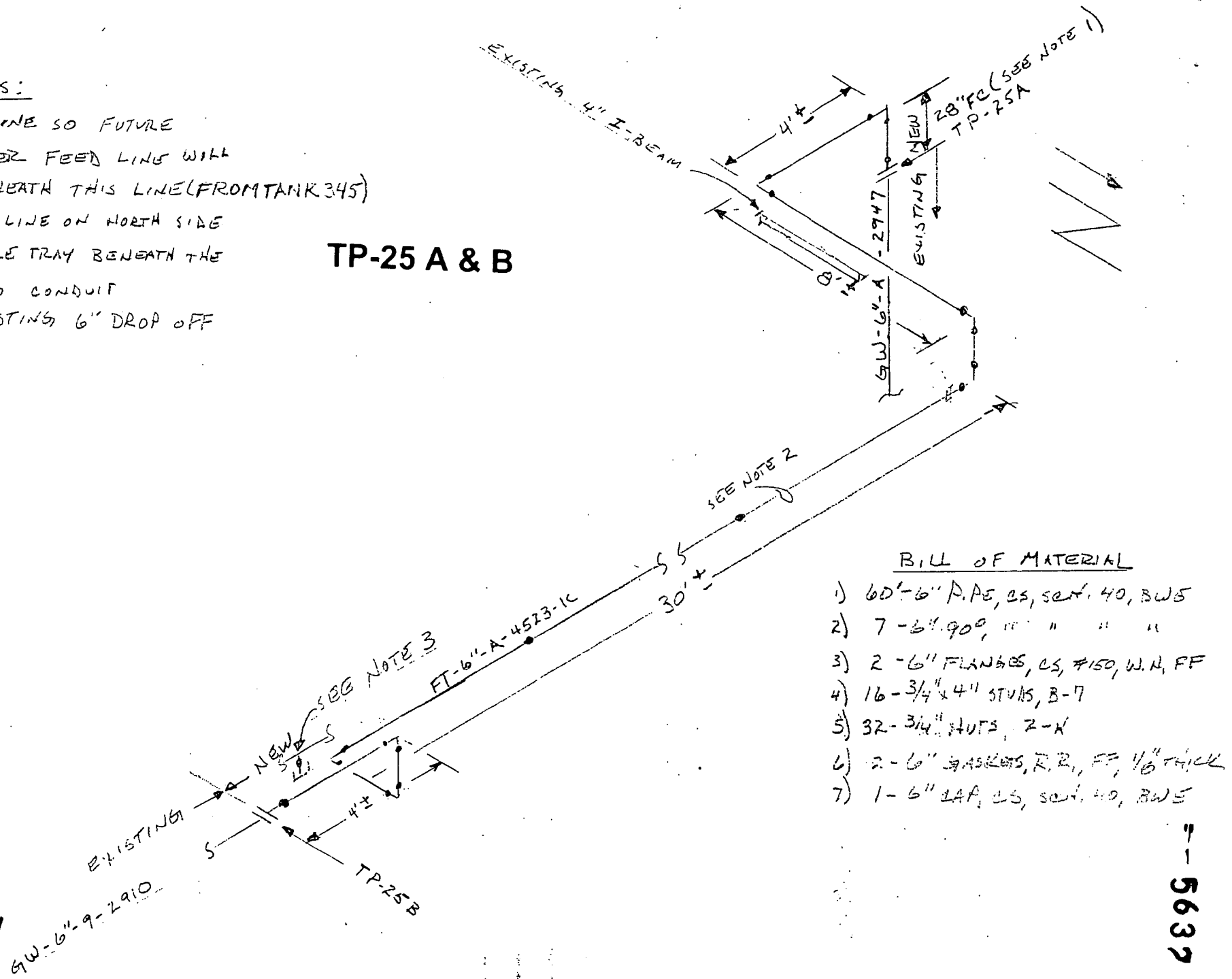


SK-ISO-012  
Sht. 1  
8-10-04

# NOTES:

- 1) RAISE LINE SO FUTURE 6" STORMWATER FEED LINE WILL CLEAR BENEATH THIS LINE (FROM TANK 345)
- 2) RUN 6" LINE ON NORTH SIDE OF CABLE TRAY BENEATH THE EXISTING CONDUIT
- 3) CAP EXISTING 6" DROP OFF HEADER

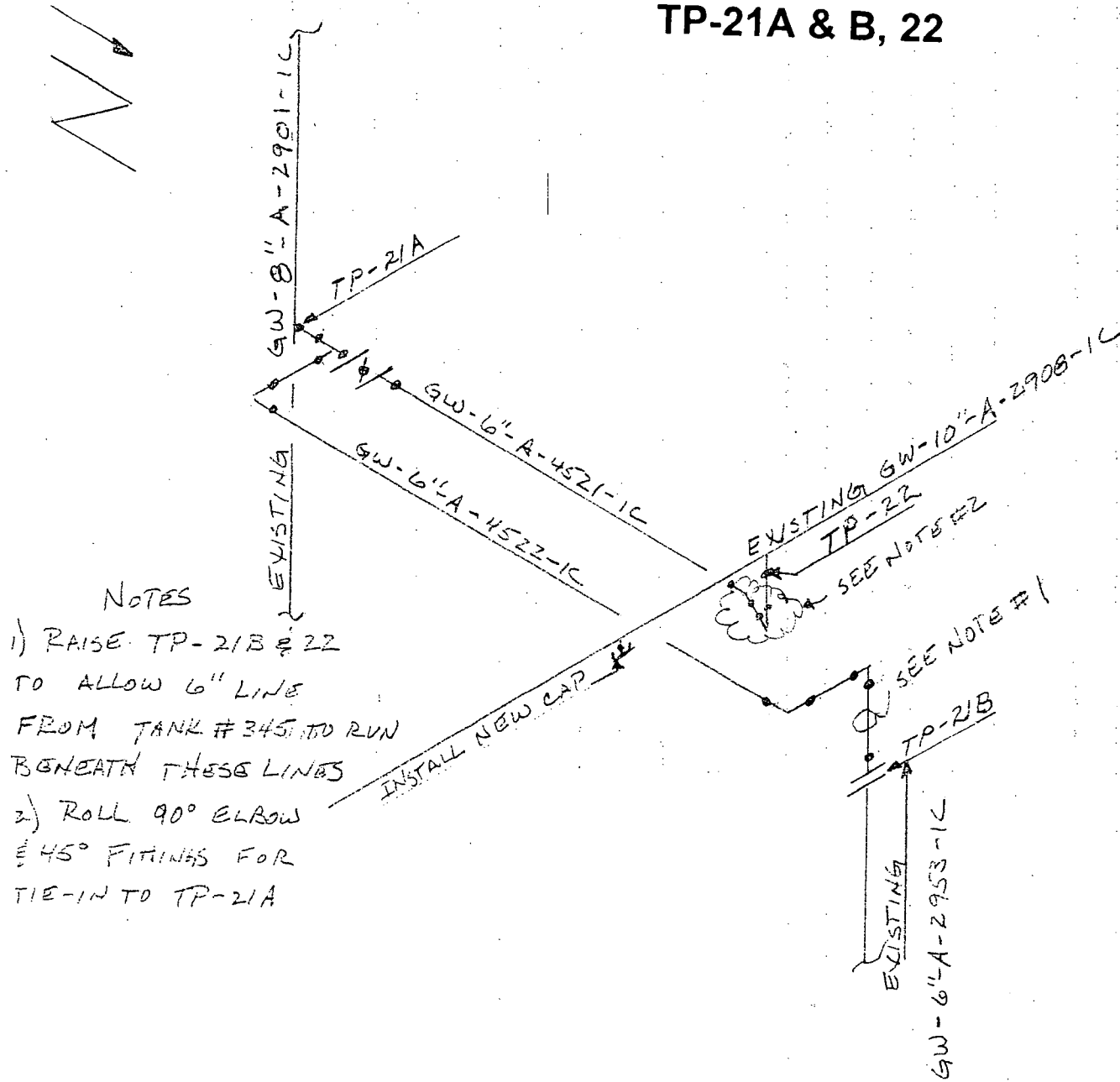
## TP-25 A & B



### BILL OF MATERIAL

- 1) 60'-6" P.A.E, CS, S&W, 40, BWS
- 2) 7'-6" 90°, " " " "
- 3) 2'-6" FLANGES, CS, #150, W.H, FF
- 4) 16-3/4" x 4" STUDS, B-7
- 5) 32-3/4" NUTS, Z-X
- 6) 2'-6" BRACKETS, R.R, FF, 1/8" THICK
- 7) 1'-6" CAP, CS, S&W, 40, BWS

# TP-21A & B, 22



## NOTES

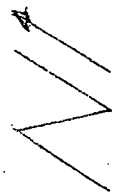
- 1) RAISE TP-21B & 22 TO ALLOW 6" LINE FROM TANK #345 TO RUN BENEATH THESE LINES
- 2) ROLL 90° ELBOW & 45° FITTINGS FOR TIE-IN TO TP-21A

## BILL OF MATERIAL

- 1) 20'-6" A.A.E, C.S., SCH. 40, B.W.E.
- 2) 4- 6" 90° " " " "
- 3) 1- 6" 45° " " " "
- 4) 1- 6" TEE " " " "
- 5) 1- 8" x 6" W.O.L., " 3000"
- 6) 3- 6" FLANGES, STEEL, #150, W.N. FF
- 7) 8- 3/4" x 4" STUDS, B-7
- 8) 16- 3/4" NUTS, HH, 2-H
- 9) 1- 6" GASKET, #150, R.R., 1/8" THICK
- 10) 1- 6" BUTTERFLY VALVE, LUG STYLE
- 11) 16- 3/4" x 2" CAP SCREWS,
- 12) 1- 6" CAP, C.S., SCH 40, B.W.E.

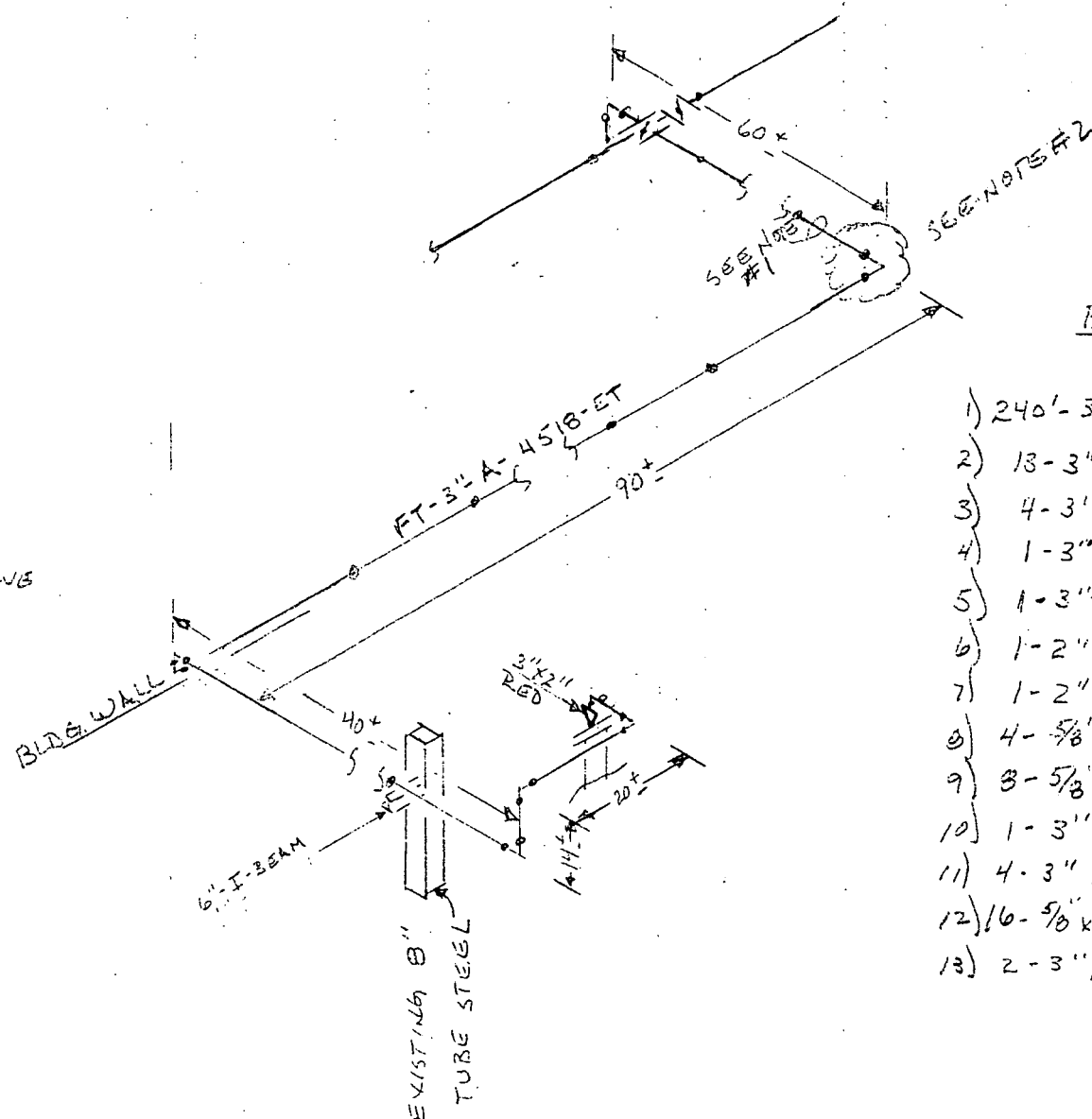
SK-ISO-Ø1Ø  
Sht. 1 8-10-04

# TP-20



## NOTES:

- 1) RUN 3" LINE ABOVE DOORWAY & BETWEEN 6" PIPES SOUTH OF THE DOORWAY
- 2) USE 45° & 90° FITTINGS TO RUN LINE BETWEEN THE EXISTING 8" RW-A-7204 LINE AS NECESSARY



## BILL OF MATERIAL

- 1) 240' - 3" PIPE, C.S., SCH 40, B.W.E
- 2) 13 - 3" 90° " " " "
- 3) 4 - 3" 45° " " " "
- 4) 1 - 3" TEE " " " "
- 5) 1 - 3" x 2" CONJ. RED. " "
- 6) 1 - 2" FLANGE, #150, FF, W.N.
- 7) 1 - 2" GASKET, RED RUBBER, #150, FF
- 8) 4 - 5/8" x 3 1/4" STUDS, 3-7
- 9) 3 - 5/8" NUTS, HEAVY HEX WITH 2 HAND
- 10) 1 - 3" INSULATION SHOE & U-ROL
- 11) 4 - 3" FLANGES, STEEL, #150, FF
- 12) 16 - 5/16" x 1 1/2" CAPSCREWS FOR 3" RV
- 13) 2 - 3" BUTTERFLY VALVE, LOG STYL



Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 15060	Rev. 0

PIPING MATERIAL DATA SHEET  
 RATING: CLASS 150  
 MATERIAL: CARBON STEEL

MATERIAL CODE A  
 CORROSION ALLOWANCE: 0.125"  
 PRESSURE LIMIT: PER ASME/ANSI B16.5  
 TEMPERATURE LIMIT: -20°F TO 400°F  
 DESCRIPTION

SIZE  
 FROM TO

#### PIPE

3/8" - 2"

CARBON STEEL, ASTM A53 GRADE B,  
 SCHEDULE 40, THREADED

2-1/2" - 20"

CARBON STEEL, ASTM A53 GRADE B,  
 SCHEDULE 40, BUTT WELD

#### FLANGES

1/2" - 2"

CLASS 150, CARBON STEEL, FLAT FACE  
 ASTM A105, THREADED OR SLIP-ON

2-1/2" - 20"

CLASS 150, CARBON STEEL FLAT FACE  
 ASTM A105, WELD NECK OR SLIP-ON.

1/2" - 20"

CLASS 150 BLIND, CARBON STEEL, ASTM  
 A105, FLAT FACE

#### FITTINGS

3/8" - 2"

CLASS 150, MALLEABLE IRON, ASTM  
 A105; THREADED.

3/8" - 2"

CLASS 150, SCREWED MALLEABLE IRON,  
 ASTM A105 THREADOLET.  
 CAP.

PLUG, SQUAREHEAD.  
 PLUG, HEX HEAD.

2-1/2" - 20"

SEAMLESS CARBON STEEL, BUTT WELD  
 ENDS, ASTM A234 GRADE WPB,  
 STANDARD WEIGHT.

Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 15060	Rev. 0

PIPING MATERIAL DATA SHEET  
RATING: CLASS 150  
MATERIAL: CARBON STEEL

MATERIAL CODE A  
CORROSION ALLOWANCE: 0.125"  
PRESSURE LIMIT: PER ASME/ANSI B16.5  
TEMPERATURE LIMIT: -20°F TO 400°F  
DESCRIPTION

SIZE  
FROM TO

#### GASKETS

2-1/2" - 20"

RED RUBBER, 1/8" THICK

#### BOLTING

STUD BOLTS WITH 2 HEAVY HEX NUTS,  
ASTM A449 GRADE B5/ASTM A194  
GRADE 2H. PROVIDE CAP SCREWS FOR  
LUG TYPE BUTTERFLIES.

#### BALL VALVES

3/8" - 2"

CLASS 150 CARBON STEEL, ASTM A105,  
THREADED CHROME PLATED BALL,  
TEFLON SEATS, WRENCH OPERATOR  
WITH LOCKING FEATURE, APOLLO 351T  
OR EQUAL.

#### BALL VALVES

2-1/2" - 8"

CLASS 150 CARBON STEEL, ASTM A216,  
GRADE WCB FLAT FACE FLG, CHROME  
PLATED BALL TEFLON SEATS, WRENCH  
OPERATOR FOR 4 INCH AND SMALLER,  
GEAR OPERATOR FOR 6 INCH LARGER  
WITH LOCKING FEATURE.

#### BUTTERFLY VALVES

4" - 20"

CLASS 150, CAST IRON, ASTM A126,  
CLASS B, LUG WAFER STYLE, 316 SS  
STEM AND DISC, EPDM SEAT, INTERGRAL  
FLANGE SEALS, LEVER HANDLE  
OPERATOR FOR 1-4 INCH, GEAR  
OPERATOR FOR 6 INCH AND LARGER,  
WITH LOCKING FEATURE.

5632

Title: Specifications for the Converted Advanced  
WasteWater Treatment Facility

Specification No: 4518-TS-0001

Date: 8-12-04

Section 15060

Rev. 0

PIPING MATERIAL DATA SHEET

RATING: CLASS 150

MATERIAL: CARBON STEEL

SIZE  
FROM TO

MATERIAL CODE A

CORROSION ALLOWANCE: 0.125"

PRESSURE LIMIT: PER ASME/ANSI B16.5

TEMPERATURE LIMIT: -20°F TO 400°F

DESCRIPTION

CHECK VALVES

1/2" - 2"

CLASS 150, CAST STEEL, ASTM A216,  
GRADE WCB THREADED SWING TYPE,  
11-13 CR TRIM.

2 1/2" - 12"

CLASS 150, CAST STEEL, ASTM A216,  
SPRING TYPE BRONZE TRIM, FLAT FACE  
FLANGE

GLOBE VALVES

1/2" - 2"

CLASS 2500, 316 STAINLESS STEEL,  
DELTRIN SEAT, THREADED ENDS AND  
GAUGE PORTS; SWAGELOK "WHITEY"  
P AND PG SERIES, OR EQUAL.

2" - 4"

CLASS 800, CARBON STEEL, ASTM A105,  
THREADED BOLTED BONNET, OS&Y,  
12 PERCENT CHROME TRIM.

END OF SECTION

CAWWT  
TIE-POINT LIST

TIE-POINT NUM.	FROM	TO	DRAWING REFERENCE		
			P&ID	ISO.	PIPING
TP-1A	WW-4"/8"-HDPE OSDF Lift Station	V-45072 @ MH-142 SWRB(Stage 1)	51D-5500-N-01316	SK-ISO-014	51D-5500-P-01328
TP-1B	CS-4" @ MH-142 Leachate/Backwash	WW-4"/8"-BA-1001 SWRB	51D-5500-N-01316	SK-ISO-014	51D-5500-P-01328
TP-1C	CS-4" @ MH-142 Backwash	WW-4"/8"-BA-1000 SWRB(Stage1)	51D-5500-N-01316	SK-ISO-014	51D-5500-P-01328
TP-2A	FG	FG-4" To Heating Units			51D-5500-P-01328
TP-2B	DW	DW-2" To CAWWT			51D-5500-P-01328
TP-2C	Future AWWT Exc Pumps	CE-6"-HDPE To Treatment	51D-5500-N-01316		51D-5500-P-01328
TP-3A	GW-10"-HDPE SWRB	V-45014 To Treatment	51D-5500-N-01316	SK-ISO-001	51D-5500-P-01329
TP-3B	CE-6"-CS, SWRB/AWWT Exca.	V-45013 To Treatment	51D-5500-N-01316	SK-ISO-001	51D-5500-P-01329
TP-4A	FT-12"-HDPE, Treated Effluent&WPA Wells	FT-12"-HDPE To GMR	51D-5500-N-01321	SK-ISO-001	51D-5500-P-01329
TP-5A	FT-12"-HDPE, Treated Effluent &WPA	(New) FT-12" HDPE	51D-5500-N-01321		51D-5500-P-01330
TP-5B	(New) FT-12" HDPE	TWI-24"-HDPE Exist 24"AWWT to	51D-5500-N-01321		51D-5500-P-01330
TP-6A	10" HDPE	V-45093 To Treatment	51D-5500-N-01316	SK-ISO-001	51D-5500-P-01330
TP-6B	GW-10"-HDPE SWRB	To New 10" HDPE	51D-5500-N-01316		51D-5500-P-01330
TP-10	GW-12"-A-2899-ET Groundwater crossconnect	To Tank 345	51D-5500-N-01315	SK-ISO-002	51D-5500-P-01341
TP-12A	WW-4"/8"-BA-1000 Backwash /Discharge	BW-4"/8"-A-4504-ET To BW/Leachate	51D-5500-N-01316	SK-ISO-001	51D-5500-P-01329
TP-13	BW-6"-A-4515-ET Leachate	BW-4"-A-4504-ET Tank344	51D-5500-N-01316	SK-ISO-003	51D-5500-P-01341
TP-14	GW-6"-A-4508-ET BSL(SWRB)	GW-6"-A-4509-ET New duplex strainer and Tank 344	51D-5500-N-01316	SK-ISO-004	51D-5500-P-01341
TP-15A	GW-8"-A-2901-ET Backwash Supply	BW-8"-A-4501-ET	51D-5500-N-01315	SK-ISO-005	51D-5500-P-01341
TP-15B	BW-8"-A-4501-ET	BW-8"-A-7202-ET Exist Backwash Piping	51D-5500-N-01315	SK-ISO-005	51D-5500-P-01341
TP-16A	GW-6"-A-2926-IC Exist Treated Effluent	FT-10"-A-4526-ET	51D-5500-N-01321	SK-ISO-006	51D-5500-P-01341
TP-16B	FT-10"-A-4526-ET	Duplex strainer	51D-5500-N-01321	SK-ISO-006	51D-5500-P-01341
TP-17A	Treated Effluent from reloc. Duplex strainer	FT-10"-A-4225-ET	51D-5500-N-01321	SK-ISO-006	51D-5500-P-01341
TP-17B	FT-10"-A-4225-ET	GW-10"-A-2926-ET Exist. Effluent	51D-5500-N-01321	SK-ISO-006	51D-5500-P-01341
TP-18	GW-6"-A-2950-IC Stormwater Pumps	CE-6"-A-4527-IC To MM-3 inlet	51D-5500-N-01318	SK-ISO-007	51D-5500-P-01344

CAWWT  
TIE-POINT LIST

-- 5632

TP-19A	BW-8"-A-7204 Exist Backwash	6" Dilute Acid	51D-5500-N-01318	SK-ISO-008	51D-5500-P-01341/1344
TP-19B	6" Dilute Acid	Exist. 6" Dilute Acid	51D-5500-N-01318	SK-ISO-007	51D-5500-P-01341
TP-19C	Exist. 6" Dilute Acid	BW-6"-A-7204-ET To Tank 221	51D-5500-N-01316	SK-ISO-008	51D-5500-P-01341
TP-20	Exist. SL-3", Slurry Dewatering Facility	Valve #V-45085/ Tank 345	51D-5500-N-01316	SK-ISO-009	51D-5500-P-01344
TP-21A	GW-8"-A-2901-IC MM3(Storm)	GW-6"-A-4522-IC	51D-5500-N-01318	SK-ISO-010	51D-5500-P-01344
TP-21B	GW-6"-A-4522-IC	GW-6"-A-2953-IC MM4(Act Carbon)	51D-5500-N-01318	SK-ISO-010	51D-5500-P-01344
TP-22	GW-10"-A-2908-IC Groundwater	GW-6"-A-4521-IC Activated Carbon Crosstie	51D-5500-N-01317	SK-ISO-010	51D-5500-P-01344
TP-23	GW-10"-A-2901-IC Stormwater Pumps	CE-6"-A-4527-IC MM-1 (stormwater)	51D-5500-N-01317	SK-ISO-010	51D-5500-P-01344
TP-24A	GW-10"-A-2926-ET Treated Effluent	FT-12"-B4 ARASA reroute line	51D-5500-N-01321	SK-ISO-001/006	51D-5500-P-01329
TP-24B				SK-ISO-006	
TP25A	GW-6"-A-2947-IC Activated Carbon	FT-6"-4523-IC	51D-5500-N-01318	SK-ISO-011	51D-5500-P-01344
TP25B	FT-6"-A-4523-IC	GW-6"-A-2910-IC IX-3	51D-5500-N-01321	SK-ISO-011	
TP-26	IA-2"-A-4529 New Air Compressor	IA-3"-A-3000, Exist Air Header (Stage 2)	51D-5500-N-01322		
TP-27	Exist. SL-2", T-221,T- 344&T-345 Bottoms	SL-2"-A-4530-ET Progressive Cavity Pumps	51D-5500-N-01316	SK-ISO-012	51D-5500-P-01341
TP-28A	CE-6"-A-4516-ET	Exist. 6" Final Wash	51D-5500-N-01316	SK-ISO-007	51D-5500-P-01341
TP-28B	Exist. 6" Final Wash	CE-6"-A-4516-IC	51D-5500-N-01318	SK-ISO-007	51D-5500-P-01344

CAWWT  
NEW PIPE - LINE LIST

Line Number					Start	End	P&ID #	REMARKS
Service	Size	Mat'l. Spec	Seq. Num.	Insul.				
GW-	6"-	A-	4500-	ET	GW-12"-A-2899-ET	TANK 345	51D-5500-N-01315	
BW-	8"-	A-	4501-	ET	GW-10"-A-2901-ET	BW-8"-A-7200-ET	51D-5500-N-01315	
GW-	4"-	A-	4502-	ET	GW-6"-A-4500-ET	GW-6"-A-4500-ET	51D-5500-N-01316	FE-345B BY-PASS
GW-	4"-	A-	4503-	ET	GW-6"-A-4500-ET	GW-6"-A-4500-ET	51D-5500-N-01316	LCV-345B BY-PASS
BW-	4"/8"-	A-	4504-	ET	WW-4"/8"-B4-1000	TANK 344	51D-5500-N-01316	
BW-	4"-	A-	4505-	ET	BW-4"-A-4504-ET	BW-4"-A-4504-ET	51D-5500-N-01316	FE-345C BY-PASS
BW-	4"-	A-	4506-	ET	BW-4"-A-4504-ET	BW-4"-A-4504-ET	51D-5500-N-01316	LCV-345C BY-PASS
GW-	6"-	A-	4507-	ET	GW-6"-A-4508-ET	GW-10"-HDPE	51D-5500-N-01316	
GW-	6"	A-	4508-	ET	CE-6"-HDPE	(EXIST. 6" LINE)	51D-5500-N-01316	
GW-	6"-	A-	4509-	ET	CE-6"-HDPE	TANK 344	51D-5500-N-01316	
GW-	4"-	A-	4510-	ET	GW-6"-A-4509-ET	GW-6"-A-4509-ET	51D-5500-N-01316	FE-345A BY-PASS
GW-	4"-	A-	4511-	ET	GW-6"-A-4509-ET	GW-6"-A-4509-ET	51D-5500-N-01316	LCV-345A BY-PASS
BW-	8"-	A-	4512-	ET	TANK 221	PMP-223	51D-5500-N-01316	
BW-	8"-	A-	4513-	ET	BW-8"-A-4512-ET	PMP-222	51D-5500-N-01316	
BW-	6"-	A-	4514-	ET	PMP-222	BW-6"-A-4515-ET	51D-5500-N-01316	
BW-	6"-	A-	4515-	ET	PMP-223	BW-4"/8"-A-4504-ET	51D-5500-N-01316	
CE-	6"-	A-	4516-	ET/IC	PMP'S 346 & 347	CE-6"-4527-IC	51D-5500-N-01316	
CE-	8"-	A-	4517-	ET	TANK 345	PMP'S 346 & 347	51D-5500-N-01316	
FT-	3"-	A-	4518-	ET	FILTRATE LINE	TANK 345	51D-5500-N-01316	
SU-	2"-	A-	4519-	ET	CONT. SUMP PMP'S	TANK 344	51D-5500-N-01316	
SL-	2"-	A-	4520-	ET	PMP'S 348 & 349	TANK 221	51D-5500-N-01316	
GW-	6"-	A-	4521-	IC	GW-10"-A-2908-IC	GW-6"-A-4522-IC	51D-5500-N-01318	
GW-	6"-	A-	4522-	IC	GW-6"-A-2953-IC	GW-8"-A-2901-IC	51D-5500-N-01318	
FT-	6"-	A-	4523-	IC	GW-6"-A-2947-IC	GW-6"-A-2910-IC	51D-5500-N-01318	
FT-	10"-	A-	4524-	ET	GW-10"-A-2926-ET	FT-12"-HDPE	51D-5500-N-01321	
FT-	10"-	A-	4525-	ET	GW-10"-A-2926-ET	GW-10"-A-2926-ET	51D-5500-N-01321	
FT-	10"-	A-	4526-	ET	GW-10"-A-2926-ET	GW-10"-A-2926-ET	51D-5500-N-01321	
CE-	6"-	A-	4527-	IC	GW-6"-A-2950-IC	GW-10"-A-2901-IC	51D-5500-N-01318	
CE-	6"-	A-	4528-	ET	TANK 344	TANK 345	51D-5500-N-01316	OVERFLOW
IA-	2"-	A-	4529		NEW INST. AIR COMP	-	-	
SL-	2"-	A-	4530-	ET	T-221, 345 & 344	PMP'S 348 & 349	51D-5500-N-01316	
FT-	12"-	B4-			FT-10"-A-4524-ET	FT-12"-HDPE	51D-5500-N-01321	
BW-	6"-	A-	7204-	ET	(EXIST. 6" DILUTE)	TANK 221	51D-5500-N-01316	

CAWWT  
NEW VALVE LIST

--5632

VALVE No.	SIZE	TYPE	LOCATION	P&ID No.	REMARKS
V-45000	10"	Butterfly	GW-10"-A-2901-ET	51D-5500-N-01315	
V-45001	4"	Butterfly	GW-4"-A-4500-ET	51D-5500-N-01316	
V-45002	4"	Butterfly	GW-4"-A-4500-ET	51D-5500-N-01316	
V-45003	4"	Butterfly	GW-4"-A-4502-ET	51D-5500-N-01316	
V-45004	4"	Butterfly	GW-4"-A-4500-ET	51D-5500-N-01316	
V-45005	4"	Butterfly	GW-4"-A-4500-ET	51D-5500-N-01316	
V-45006	4"	Butterfly	GW-4"-A-4503-ET	51D-5500-N-01316	
V-45007	3"	Butterfly	BW-3"-A-4504-ET	51D-5500-N-01316	
V-45008	3"	Butterfly	BW-3"-A-4504-ET	51D-5500-N-01316	
V-45009	4"	Butterfly	BW-4"-A-4505-ET	51D-5500-N-01316	
V-45010	3"	Butterfly	BW-3"-A-4504-ET	51D-5500-N-01316	
V-45011	3"	Butterfly	BW-3"-A-4504-ET	51D-5500-N-01316	
V-45012	4"	Butterfly	BW-4"-A-4506-ET	51D-5500-N-01316	
V-45013	6"	Check	GW-6"-A-4508-ET	51D-5500-N-01316	
V-45014	6"	Check	GW-6"-A-4507-ET	51D-5500-N-01316	
V-45015	4"	Butterfly	GW-4"-A-4509-ET	51D-5500-N-01316	
V-45016	4"	Butterfly	GW-4"-A-4509-ET	51D-5500-N-01316	
V-45017	4"	Butterfly	GW-4"-A-4510-ET	51D-5500-N-01316	
V-45018	4"	Butterfly	GW-4"-A-4509-ET	51D-5500-N-01316	
V-45019	4"	Butterfly	GW-4"-A-4509-ET	51D-5500-N-01316	
V-45020	4"	Butterfly	GW-4"-A-4511-ET	51D-5500-N-01316	
V-45021	3/4"	Ball	PI-1005A	51D-5500-N-01316	Sensing
V-45022	3/4"	Ball	PI-1005A	51D-5500-N-01316	Calibrating
V-45023	3/4"	Ball	PDSH-1005	51D-5500-N-01316	
V-45024	3/4"	Ball	PI-115B	51D-5500-N-01316	Sensing
V-45025	3/4"	Ball	PI-1005B	51D-5500-N-01316	Calibrating
V-45026	3/4"	Ball	PDSH-1005	51D-5500-N-01316	
V-45027	8"	Butterfly	T-221	51D-5500-N-01316	OUTLET (Noz. )
V-45028	3/4"	Ball	T-221	51D-5500-N-01316	Drain
V-45029	8"	Butterfly	BW-8"-A-4512-ET	51D-5500-N-01316	PMP-223/Suction
V-45030	3/4"	Ball	BW-8"-A-4512-ET	51D-5500-N-01316	Drain
V-45031	3/4"	Ball	PMP-223	51D-5500-N-01316	Casing
V-45032	6"	Check	BW-6"-A-4515-ET	51D-5500-N-01316	PMP-223/Discharge
V-45033	6"	Butterfly	BW-6"-A-4515-ET	51D-5500-N-01316	PMP-223/Discharge
V-45034	3/4"	Ball	PI-223	51D-5500-N-01316	Sensing
V-45035	3/4"	Ball	PI-223	51D-5500-N-01316	Calibrating
V-45036	8"	Butterfly	BW-8"-A-4513-ET	51D-5500-N-01316	PMP-222/Suction
V-45037	3/4"	Ball	BW-8"-A-4513-ET	51D-5500-N-01316	Drain
V-45038	3/4"	Ball	PMP-222	51D-5500-N-01316	Casing - Drain
V-45039	6"	Check	BW-6"-A-4515-ET	51D-5500-N-01316	PMP-222/Discharge
V-45040	6"	Butterfly	BW-6"-A-4515-ET	51D-5500-N-01316	PMP-222/Discharge
V-45041	3/4"	Ball	PI-222	51D-5500-N-01316	Sensing
V-45042	3/4"	Ball	PI-222	51D-5500-N-01316	Calibrating
V-45043	8"	Butterfly	CE-8"-A-4517-ET	51D-5500-N-01316	
V-45044	3/4"	Ball	CE-8"-A-4517-ET	51D-5500-N-01316	Drain
V-45045	3/4"	Ball	PI-347	51D-5500-N-01316	Calibrating
V-45046	3/4"	Ball	PMP-347	51D-5500-N-01316	Casing - Drain
V-45047	6"	Check	CE-6"-A-4516-ET	51D-5500-N-01316	PMP-347/Discharge
V-45048	6"	Butterfly	CE-6"-A-4516-ET	51D-5500-N-01316	PMP-347/Discharge
V-45049	6"	Butterfly	CE-8"-A-4517-ET	51D-5500-N-01316	
V-45050	3/4"	Ball	CE-8"-A-4517-ET	51D-5500-N-01316	Drain

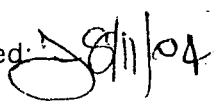
CAWWT  
NEW VALVE LIST

V-45051	3/4"	Ball	PMP-346	51D-5500-N-01316	Casing - Drain
V-45052	6"	Check	CE-6"-A-4516-ET	51D-5500-N-01316	PMP-346/Discharge
V-45053	6"	Butterfly	CE-6"-A-4516-ET	51D-5500-N-01316	PMP-346/Discharge
V-45054	3/4"	Ball	PI-346	51D-5500-N-01316	Sensing
V-45055	3/4"	Ball	PI-346	51D-5500-N-01316	Calibrating
V-45056	8"	Butterfly	T-345	51D-5500-N-01316	Outlet (Noz. )
V-45057	3/4"	Ball	CE-8"-A-4517-ET	51D-5500-N-01316	Drain @ Tank 345
V-45058	3/4"	Ball	PI-347	51D-5500-N-01316	Sensing
V-45059	2"	Ball	SU-2"-A-4519-ET	51D-5500-N-01316	
V-45060	2"	Ball	SL-2"-A-4530-ET	51D-5500-N-01316	PMP-348/Suction
V-45061	2"	Ball	SL-2"-A-4530-ET	51D-5500-N-01316	PMP-349/Suction
V-45062	2"	Ball	SL-2"-A-4520-ET	51D-5500-N-01316	PMP-348/Discharge
V-45063	2"	Ball	SL-2"-A-4520-ET	51D-5500-N-01316	PMP-349/Discharge
V-45064	3/4"	Ball	SL-2"-A-4520-ET	51D-5500-N-01316	Drain @ PMP-348 disc.
V-45065	3/4"	Ball	SL-2"-A-4520-ET	51D-5500-N-01316	Drain @ PMP-349 disc.
V-45066	6"	Butterfly	CE-6"-A-4517-IC	51D-5500-N-01317	Chain Operated
V-45067	6"	Butterfly	GW-6"-A-4521-IC	51D-5500-N-01317	Chain Operated
V-45068	10"	Butterfly	FT-10"-A-4526-ET	51D-5500-N-01321	
V-45069	3/4"	Ball	GW-4"-A-4502-ET	51D-5500-N-01316	Vent
V-45070	3/4"	Ball	GW-4"-A-4503-ET	51D-5500-N-01316	Vent
V-45071	6"	Butterfly	BSL-6"-A-3500-ET	51D-5500-N-01316	
V-45072	4"	Ball	WW-4"-8"-HDPE	51D-5500-N-01316	
V-45073	4"	Ball	WW-4"-8"-HDPE	51D-5500-N-01316	
V-45074	4"	Ball	FE-1004	51D-5500-N-01316	By-pass
V-45075	4"	Ball	WW-4"-8"-HDPE	51D-5500-N-01316	
V-45076	6"	Butterfly	GW-6"-A-4509-ET	51D-5500-N-01316	
V-45077	2"	Check	SL-2"-A-4520-ET	51D-5500-N-01316	PMP-349/Discharge
V-45078	2"	Check	SL-2"-A-4520-ET	51D-5500-N-01316	PMP-348/Discharge
V-45079	3/4"	Ball	PI-349	51D-5500-N-01316	Sensing
V-45080	3/4"	Ball	PI-348	51D-5500-N-01316	Sensing
V-45081	3/4"	Ball	PI-349	51D-5500-N-01316	Calibrating
V-45082	3/4"	Ball	PI-348	51D-5500-N-01316	Calibrating
V-45083	2"	Check	SU-2"-A-4519-ET	51D-5500-N-01316	
V-45084	2"	Check	SU-2"-A-4519-ET	51D-5500-N-01316	
V-45085	3"	Butterfly	FT-3"-A-4518-ET	51D-5500-N-01316	
V-45086	3"	Butterfly	(EXIST.) 3" Line	51D-5500-N-01316	Valve @ TP-20
V-45087	2"	Ball	IA-2"-A-4529	51D-5500-N-01322	Valve @ TP-26
V-45088	3/4"	Ball	GW-6"-A-4509-ET	51D-5500-N-01316	Drain
V-45089	3/4"	Ball	GW-6"-A-4509-ET	51D-5500-N-01316	Drain
V-45090	3/4"	Ball	GW-6"-A-4509-ET	51D-5500-N-01316	Drain
V-45091	3/4"	Ball	BW-4"-A-4504-ET	51D-5500-N-01316	Drain
V-45092	3/4"	Ball	BW-4"-A-4504-ET	51D-5500-N-01316	Drain
V-45093	10"	Gate	GW-10"-HDPE	51D-5500-N-01316	



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Approved: 

**SECTION 15140**  
**SUPPORTS AND ANCHORS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Pipe and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Sleeves and seals.

**1.2 REFERENCES**

- A. ASME B31.3 – Process Piping
- B. ASTM F708 - Design and Installation of Rigid Pipe Hangers.

**1.3 SUBMITTALS**

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

**PART 2 PRODUCTS**

**2.1 PIPE HANGERS AND SUPPORTS**

- A. Piping Systems:
  - 1. Conform to ASME B31.3.
  - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 4. Multiple Hangers: Welded steel bracket with U-bolt guides or clevis hangers as required.

5. Wall and fabricated Supports: Welded steel bracket with U-bolts.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Pipe leg with floor flange.

## 2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

## 2.3 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Metal Counterflashing: 22 gage galvanized steel.

# PART 3 EXECUTION

## 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

## 3.2 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 24 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple hangers.
- F. Support riser piping independently of connected horizontal piping.

## 3.3 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 10 inches thick and extending 3 inches beyond supported equipment. Scarify existing slab before installing pad.
- B. Provide anchor bolts, and accessories for mounting and anchoring equipment.
- C. Provide rigid anchors for pipes after vibration isolation components are installed.

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### 3.4 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls.


B. Seal floor drains watertight to adjacent materials.

### 3.5 SCHEDULES

#### A. Metal Piping

<b>PIPE SIZE</b>	<b>MAX. HANGER SPACING</b>	<b>HANGER ROD DIAMETER</b>
<u>Inches</u>	<u>Feet</u>	<u>Inches</u>
1/2 to 1-1/4	.7	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	12	1/2
4 to 6	14	5/8
8 to 12	20	7/8
14 and Over	25	1

**END OF SECTION**

Approved:  8/11/

## SECTION 15160

### PUMPS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Base-mounted horizontal centrifugal stormwater supply pumps (PMP-346 and PMP-347).
- B. See Appendix A, Pump Proposal.
- C. Product Data: Certified pump curves for each pump model and size supplied showing performance characteristic with pump and system operating point plotted. Include net positive suction head curve.
- D. Completed Pump Data Sheets.
- E. Certificates: Alignment certification and manufacturer's certificates of conformance to specification requirements.
- F. Installation instructions, start-up and troubleshooting instructions, operational and maintenance data, lubrication instructions, and spare parts list.
- G. Test Reports.

##### 1.2 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry place and protect from weather prior to shipment. Provide protection from weather and from damage during transit.
- B. Loose items shall be tagged and delivered in a standard commercial package. The package shall be protected from the weather, climate conditions including temperature and humidity variations, dirt and dust, and other contaminants that could adversely affect assembly and operation of the pumps.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURER

- A. Goulds Model 3196, or equal.

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## 2.2 EQUIPMENT

### A. General Construction Requirements

1. The balancing of the rotating parts, statically and dynamically, shall be in accordance with the manufacturer's standards.

### B. See Appendix A, Pump Proposal.

### C. Sound power levels from pumps shall not exceed 85 dBA at 5 feet.

## 2.3 FABRICATION

- A. Prior to shipment, the pump/motor assembly shall be cleaned of all dirt, dust, grease, grime, weld spatter, and other foreign material. Pumps shall be primed and painted in accordance with manufacturer's standard finish. Any open end connections shall be sealed to prevent the entrance of foreign material.

## 2.4 LABELING

- A. Equipment Identification: All pumps shall be provided with a permanently attached stainless steel nameplate indicating equipment name, number, model number, and rated capacity. Lettering shall be a minimum of 3/8 inches high and shall be stamped. Nameplates shall be located for unobstructed viewing when equipment is installed.

## PART 3 EXECUTION

### 3.1 ERECTION/INSTALLATION/APPLICATION

- A. The installation of the equipment specified and shown on the drawings shall be in accordance with the manufacturer's installation manual.
- B. A copy of the manufacturer's installation and service manual for each piece of the equipment shall be available at the site.
- C. Alignment: Final alignment after piping connections shall be performed and certified by a qualified person prior to commissioning and start-up.

**END OF SECTION**

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**APPENDIX A**  
**PUMP PROPOSAL**

Goulds Pumps



RA Mueller

 11270 Cornell Park Drive  
 Cincinnati, OH 45242  
 PH: (513) 247-5312  
 FX: (513) 247-5330

5632

Fluor

Proposal No: 0407222

Item No: ITEM001

9 Jun, 2004

MODEL: 3196 Size: 3x4-10 MTX QTY: 2

## Operating conditions

SERVICE  
 LIQUID: Storm Water Pump Temp. 70.0 deg F (Norm. 70.0 deg F). SP. GR  
 1.000, Viscosity 1.000 cp  
 CAPACITY Norm./Rate 600.0 / 600.0 gpm  
 HEAD 320.0 ft

## Performance at 3560 RPM

PUBLISHED EFFY 72.0% (CDS)  
 ADJUSTED EFFY 71.5% with contract seal  
 ADJUSTED POWER 67.8 hp (incl. Mechanical seal drag 0.44). (Run out 80.4 hp)  
 PSHR 15.9 (ft)  
 DISCH. PRESSURE 138.5 (170.6 @ Shut off) (psi g)  
 PERFORM. CURVE 1616-9 (Rotation CW viewed from coupling end)  
 SHUT OFF HEAD 394.2 ft  
 MIN FLOW 185.0 (gpm)

PRICE in USD	
Pump Unit	Incl
Driver	Incl
Boxing	
Testing	
Freight	
Accessories	
Total 1 Unit	8,806
Shipment: 4-5 Wks Std FOB: Cin	

## Materials

CONSTRUCTION Ductile iron  
 CASING Ductile iron max casing pres. @ rated temp. 250.0 psi g  
 IMPELLER COVER Ductile iron  
 IMPELLER Ductile iron - Open (9.2500 rated (in) max=10.0000 min=6.0000)  
 IMPELLER GASKET Aramid Fiber with EPDM Rubber  
 IMPELLER O-RING Teflon  
 SHAFT SAE 4140  
 IMPELLER SLEEVE 316SS  
 IMPELLER LUBRICATION Flood oil  
 IMPELLER SEAL CHAMBER Taper bore plus with axial ribs  
 IMPELLER SEAL FLUSH FLUSH 316SS Flush quench and drain  
 IMPELLER BEARINGS SKF 6309 (Inboard Bearing) SKF 5309 A/C3 (Outboard Bearing)  
 IMPELLER COUPLING Rexnord-Omega Rex Elastomer- ES-20-  
 IMPELLER COUPLING GUARD Carbon steel  
 IMPELLER IMPELLER PLATE Cast iron camber top B00059A

## Sealing Method

MECHANICAL SEAL John Crane - 5610Q - Spl w/ Dbl sleeve o-ring - XO(58)XO(58)H - (Cartridge-Single)

## Impeller

10# flat face

## Impeller end features

Impeller single plane balanced to ISO G6.3

## Frame features

Ductile iron frame adapter

abyrinth oil seals - Inpro VBXX-D

Proposal No: 0407222

Item No: ITEM001

MODEL: 3196

MTX 3x4-10

Page2

## Painting

Goulds Blue water reducible coating (Strathmore)

## Warranty

3 Year Standard Warranty

## Optional Features:

### Construction

Ductile iron with 316SS impeller (over Ductile iron)

add 198

### Piping

CPI Plan 7311 316SS pipe Sch. 40

add 302

All above optional adders are per unit in (USD)

## Noise level Data

Maximum predicted sound pressures level pump only in Decibels (db) Re 0.0002 microbars measured 3ft horizontally and 5ft from the floor per QCP 580

Octave Band Center Freq.-Hz.

31.5	63	125	250	500	1k	2k	4k	8k	A
84.0	85.0	81.0	80.0	79.0	78.0	78.0	75.0	74.0	84.0

Driver: Electric motor Manufacturer: Pump mfg's Choice

FURNISHED BY Pump mfg  
 RATING 100.0 hp (74.6 KW)  
 PHASE/FREQ/VOLTS 3/60 Hz/230/460  
 INSULATION/5F F/1.15

MOUNTED BY Pump mfg  
 ENCLOSURE Eject Eff - Class I, Div II  
 SPEED 3600 RPM  
 FRAME 405TS

## Weights and Measurements

TOTAL NET UNIT WEIGHT/VOLUME  
 TOTAL GROSS UNIT WEIGHT/VOLUME

1693.0lb / 17.3ft<sup>3</sup>  
 1840.0lb / 29.3ft<sup>3</sup>

## Comments

Please call with questions.

Thanks!

Don Arrasmith  
 RA Mueller, Inc.  
 PH: 513/247-5312  
 FX: 513/247-5330  
 dona@rampump.com

Program Version 2.8.0.1

Our offer does not include specific review and incorporation of any Statutory or Regulatory Requirements and the offer is limited to the requirements of the design specifications. Should any Statutory or Regulatory requirements need to be reviewed and incorporated then the Customer is responsible to identify those and provide copies for review and revision of our offer.



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Model: 3196/HT3196    Size: 3X4-10    Group: MTX    60Hz    RPM: 3560    Stages: 1

Job/Inqu. No.

Purchaser: Fluor

User: John McCloy

Issued by: Don Arrasmith

Item/Equip.No:

Quotation No. 0407222

Date: 6/9/04

Service: Waste Water

Order No.

Certified By:

## Operating Conditions

Liquid: Waste H2O

Temp.: 70 °F

Sp. Heat:

S.G./Visc.: 1/1 cp

Flow: 600 gpm(US)

TDH: 320 ft

NPSHa:

Req. solid size:

% Solids:

Vapor Press:

## Pump Performance

Actual Pump Eff.: 72 %

Actual Pump Power: 68 hp

Mech. Seal Loss: 0 hp

Dyn. Seal Loss: 0 hp

Other Power Loss: 0 hp

Rated Total Power: 68 hp

Imp. Dia. First 1 Stg 9.25 in

NPSHr: 15.9 ft

Shut off Head: 394.2 ft

Max. Solids Size: 0.625 in

Suction Specific Speed: 10841 (gpm(U

Min. Cont. Stable Flow: 185 gpm(US)

Min. Cont. Thermal Flow:

Non-Overloading Power: 80.4 hp

Imp. Dia. Add'l Stg

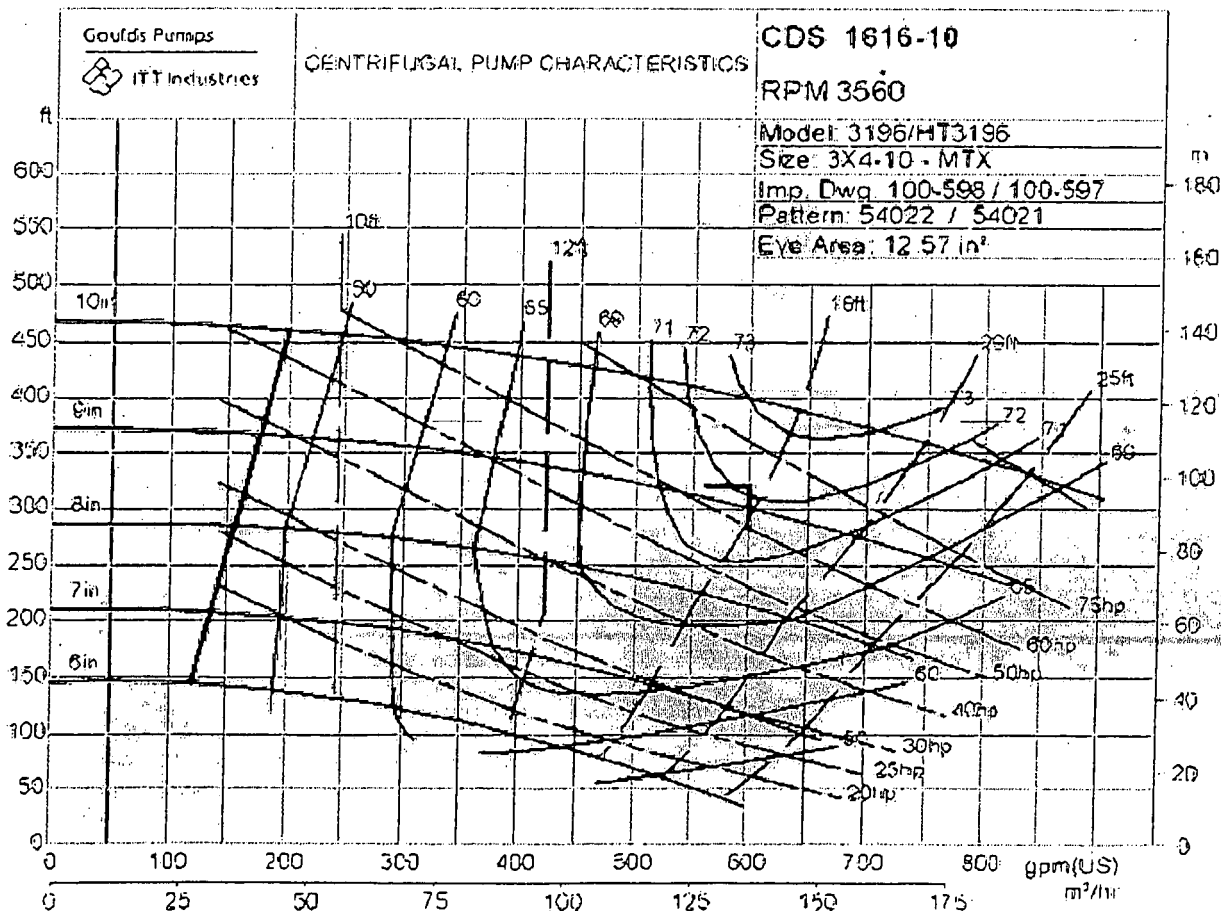
Mag. Drive Circuit Flow:


Max Drive Power:

Max Drive Temp:

Max Motor Size:

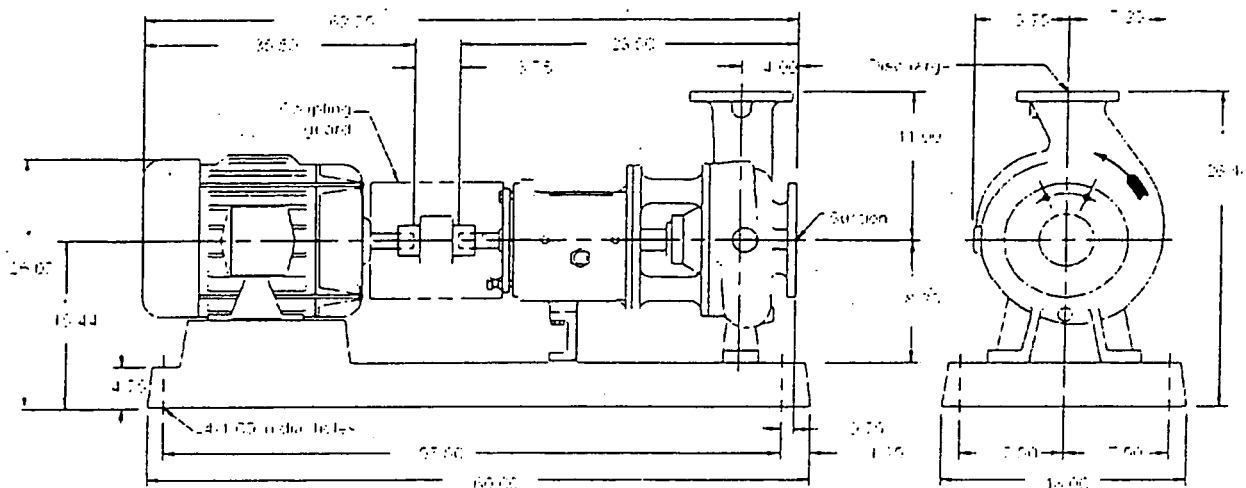
Notes: 1. The Mechanical seal increased drag effect on power and efficiency is not included, unless the correction is shown in the appropriate field above. 2. Magnetic drive eddy current and viscous effect on power and efficiency is not included. 3. Elevated temperature effects on performance are not included.





ITT Industries

**Model 3196 MTX**  
**3x4-10**



SUCT.FLANGE SIZE 4"	DRILLING ANSI 150#	FACING FF	FINISH SERRATED
DISCH.FLANGE SIZE 3"	DRILLING ANSI 150#	FACING FF	FINISH SERRATED
PUMP ROTATION (LOOKING AT PUMP FROM MOTOR) CW			
TYPE OF LUBRICATION FLOOD OIL			COOLED NY
TYPE OF STUFFING BOX TAPER BORE PLUS WITH AXIAL RIBS			COOLED NY
TYPE OF SEALING MECHANICAL SEAL			

PUMP	285.0 lb
MOTOR/CPLG	1150.0/18.0 lb
BASEPLATE	240.0 lb
TOTAL	1693.0 lb
GR VOLUME w/BOX	29.3 ft <sup>3</sup>
GR.WEIGHT w/BOX	1840.0 lb

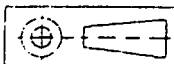
MOTOR BY PUMP MFG	MOUNT BY PUMP MFG	MFG. PUMP MFG'S CHOICE
FRAME 405TS	POWER	100.0 hp RPM 3600
PHASE 3	FREQUENCY	60 Hz VOLTS 230/460
INSULATION F	S.F.	1.15
ENCLOSURE EPAC T EFF - CLASS 1 DIV II		

- \* INSTALL FOUNDATION BOLTS IN PIPE SLEEVES
- \* ALLOW FROM 0.75 to 1.50 in FOR GROUTING SEE INSTRUCTION BOOK FOR DETAILS.
- \* MTR DIMENSIONS ARE APPROXIMATE

COUPLING BY	PUMP MFG	CPLG TYPE	REYNORD OMEGA REX ELASTOMER- ES-20
CPL GUARD BY	PUMP MFG.	CPLG GUARD MATL	CARBON STEEL
BASEPLATE	CAST IRON CAMBER TOP B00059A		
MECH SEAL	JOHN CRANE S610Q - SPCL W/ DBL SLEEVE O-RING NO(58)I,NO(58)H		

\*Tolerance is +0.05

FOR PUMP TAPPED OPENINGS REFER TO DWG.  
T0407222/ITEM001



All dimensions are in inches  
Drawing is not to scale  
Weights (lbs) are approximate

DRAWING IS FOR REFERENCE ONLY.  
NOT CERTIFIED FOR CONSTRUCTION UNLESS SIGNED.

Customer: Fluor  
Serial No:  
Customer P.O. No:  
Item No: ITEM001  
Service:

DRAWING NO 0407222/ITEM001

Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 15190	Rev. 0

Approved: **SECTION 15190****MECHANICAL IDENTIFICATION****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe Markers.

**1.2 REFERENCES**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems.
- B. ANSI Z53.1 - Safety Color Code for Marking Physical Hazards.

**1.3 SUBMITTALS**

- A. Product Data: Provide manufacturers catalog literature for each product required.

**PART 2 PRODUCTS****2.1 NAMEPLATES**

- A. Description: Laminated three-layer plastic (Lamacoid) with engraved black letters on white background. Minimum letter height to be 5/16 inches.

**2.2 TAGS**

- A. Metal Tags: Brass or Stainless Steel with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

**2.3 PIPE MARKERS**

- A. Color: Conform to ANSI Z53.1; see schedule.
- B. Size: Labels and size of legend letters shall conform to ASTM A13.1.

- C. Plastic Tape Pipe Markers (New Pipe): Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

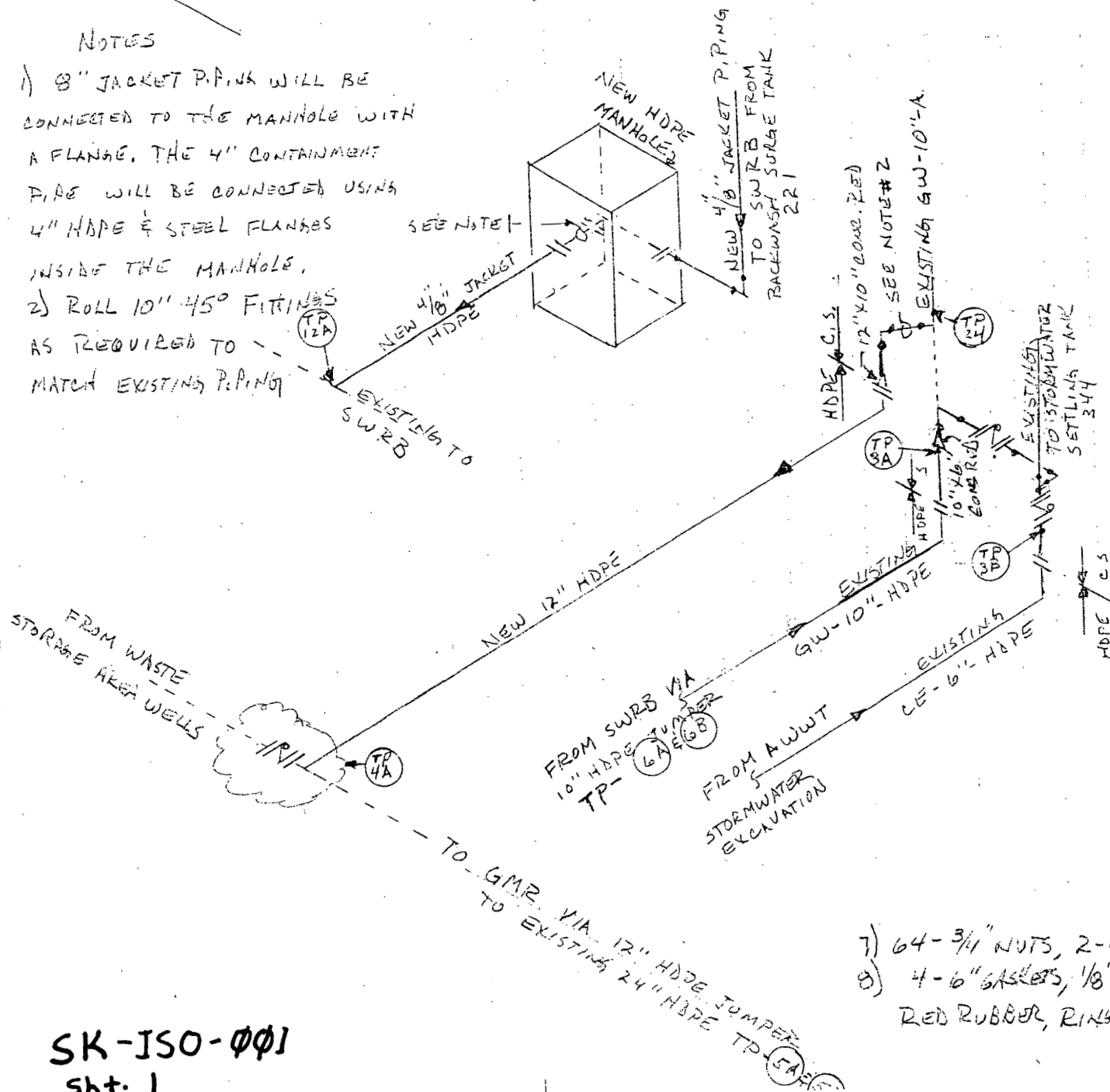
#### 3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with stainless steel wire or chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers a minimum of 12 inches directly above-buried pipe or duct. Install a minimum of 6 inches below finished grade.
- F. Identify large air handling units, pumps, tanks, and water treatment devices with stencil painting. Smaller devices may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Tag automatic controls, instruments, and relays.
- J. Identify piping, concealed or exposed, with plastic pipe markers for existing piping and plastic tape pipe markers for new piping. Use tags on piping 3/4 inch diameter and smaller. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

# TP-3A, 3B, 4A, 12A, & 24

## NOTES

- 1) 8" JACKET P.P. will be connected to the manhole with a flange. The 4" containment pipe will be connected using 4" HDPE & steel flanges inside the manhole.
- 2) Roll 10" 45° fittings as required to match existing P.P.ing



## BILL OF MATERIAL

### A) MANHOLE TIE-IN

- 1) 1-4" FLANGES, STEEL, #150, W.N., FF
- 2) 1-4" FLANGES ADAPTER, HDPE, SER II
- 3) 1-4" DUCTILE IRON BACKUP RING
- 4) 1-8" FLANGE, STEEL, #150, W.N. FF
- 5) 8-5/8" x 4 1/4" STUDS
- 6) 16-5/8" NUTS
- 7) 1-4" GASKET, 1/8" THICK, R.R., FF
- 8) 8-3/4" x 4" STUDS
- 9) 16-3/4" NUTS
- 10) 1-8" GASKET, 1/8" THICK, FF
- 11) 1-4" 90°, STEEL, SCH. 40, R.W.B.

### B) TP-24

- 1) 1-12" FLANGE, STEEL, #150, W.N., FF
- 2) 1-12" x 10" CONCR. PIPE, SCH. 40, BW
- 3) 2-10" 45°, STEEL, " " "
- 4) 1-12" GASKET, R.R., 1/8" THICK, FF

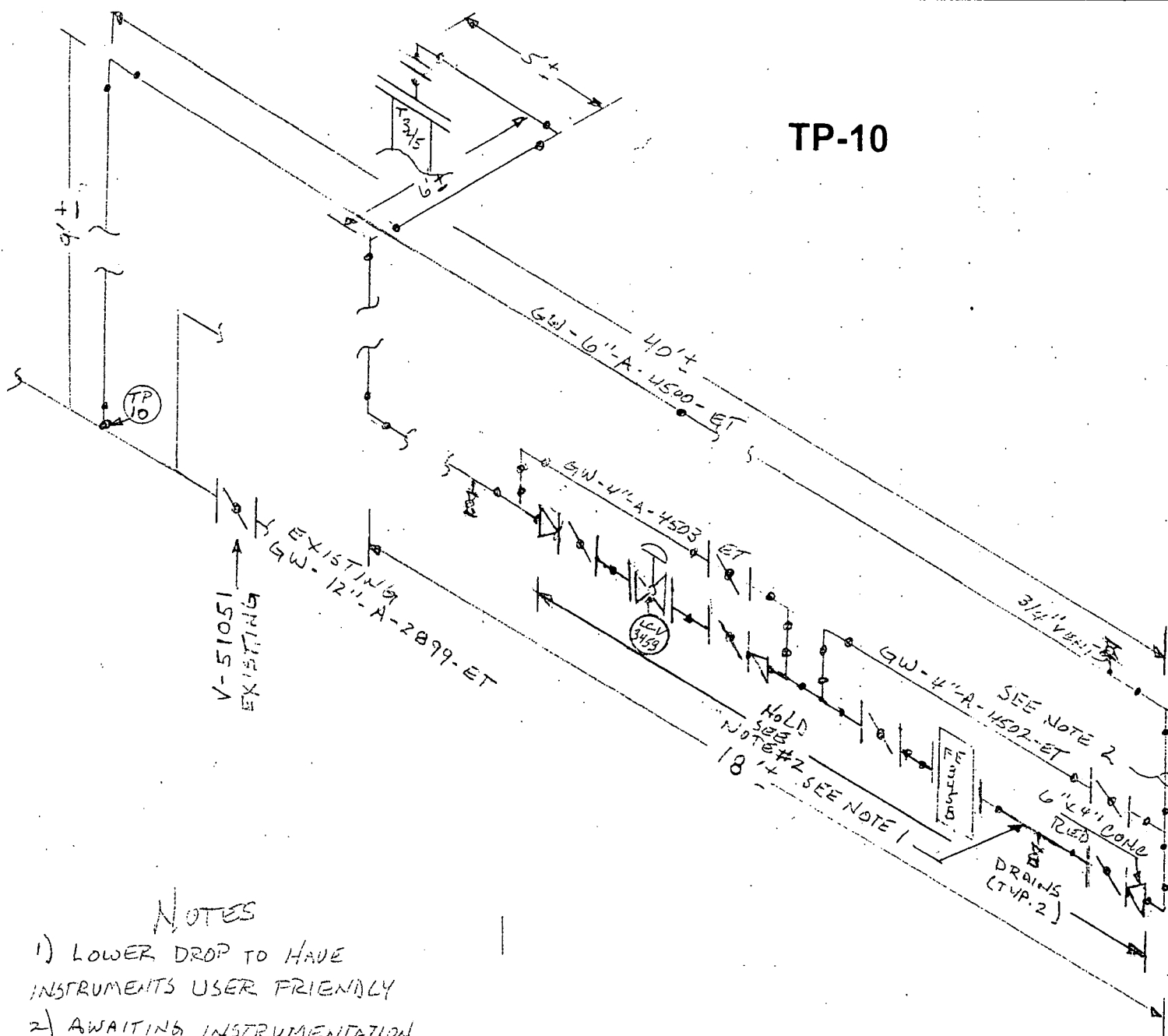
### C) TP 3A & 3B

- 1) 1-10" x 6" CONCR. PIPE, STEEL, SCH. 40, BW
- 2) 2-6" 90°, STEEL, SCH. 40, BW
- 3) 4-6" FLANGE, STEEL, #150, W.N., R.F.
- 4) 2-6" CHECK VALVES, #150, R.F.
- 5) 1-6" TEE, SCH. 40, BW
- 6) 32-3/4" x 4" STUDS, B-7
- 7) 64-3/4" NUTS, 2-H
- 8) 4-6" GASKETS, 1/8" THICK, RED RUBBER, RING TYPES

SK-ISO-001

Sht. 1  
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TP-10



# BILL OF MATERIAL

- 1) 20'-6" P.I.P.E, STEEL, SCH 40
- 2) 1 - 1/2" 46" W.O.L. CT. 3000#
- 3) 7 - 6" 90° STEEL, SCH 40, B.W.E
- 4) 4 - 6" X 4" TEES " " "
- 5) 4 - 4" FLANGES, STEEL, 150#, B.W.E
- 6) 2 - 6" FLANGES, " " "
- 7) 1 - 6" GASKETS, 1/8" RBN RUBBER, FI
- 8) 32 - 5/8" X 1 3/4" CAP SCREWS
- 9) 3 - 3/4" X 4" STUDS, B-7
- 10) 3 - 3/4" T.O.L. STEEL, 3000#
- 11) 3 - 3/4" BALL VALVE
- 12) 3 - 3/4" X 3" ALIPPLE
- 13) 1 - FABRICATED MANHOLE GUSSET
- 14) 30' 4" P.I.P.E, STEEL, SCH 40
- 15) 1 - FIELD FABRICATED MANHOLE
- 16) 32 - 5/8" NUTS, HEAVY HEX, A-7
- 17) 16 - 3/4" NUTS " " "
- 18) 2 - 4" BUTTERFLY VALVES, LUB
- 19) 3 - 4" 90° STEEL, SCH 40, B.W.E
- 20) 1 - 6" X 4" CONE RIG, STEEL, SCH 40, R.W.E

## NOTES

- 1) LOWER DROP TO HAVE INSTRUMENTS USER FRIENDLY
- 2) AWAITING INSTRUMENTATION SPEC FOR LINE SIZES FOR FE & LLV.

SK-ISO-002

Sht. 1

1) ROLL DOUBLE 45° FITNESS  
TO OBTAIN CORRECT ELEVATION  
IF NEEDED

- 2) Awaiting instrumentation  
spells for line sizes for  
FE & LEV.

3) THE DOUBLE WALL JACKET PILE IS REQUIRED TO BE RAN A MINIMUM OF 3' INSIDE THE DIKE AREA.

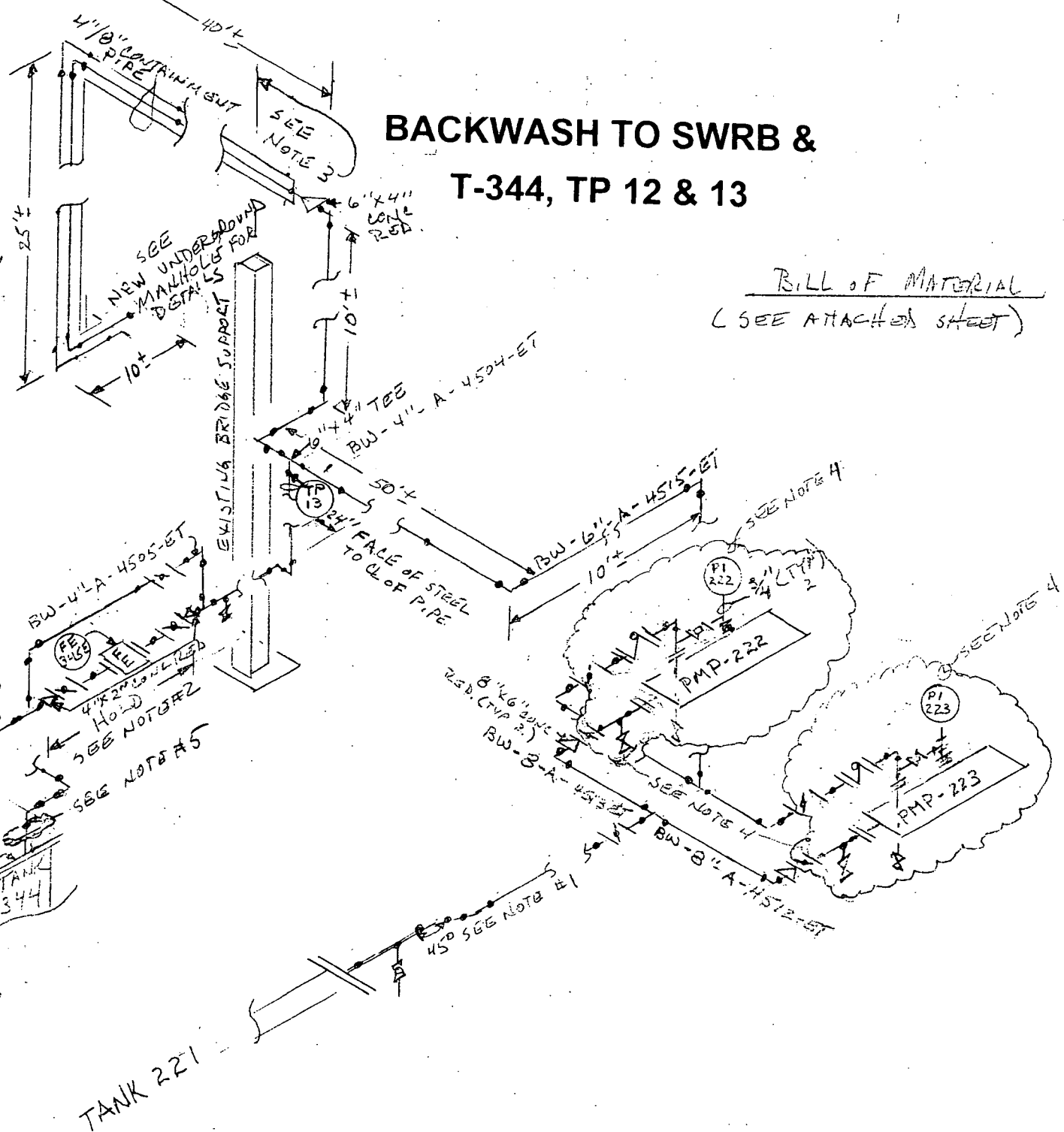
SHORT RADIUS 90° TO BE USED  
FOR JACKET PIPING

4) REVERSE  
CLOUDED  
P. P. LG &  
PUMPS

5) USE 6"x4"  
REDUCING  
FLANGE FOR  
TIE-IN ONTO  
MANWAY.

6) ALL CONTAINMENT PLAS  
WILL USE SHORT RADIUS 90°

BILL OF MATERIAL  
(SEE ATTACHED SHEET)



SK-ISO-003

# Sht. 1

8-10-04

BILL OF MATERIAL FOR  
BACKWASH TO SWRB ET-344

- |   |  |
|---|--|
| 1) 100' - 8" P.A.E, STEEL, SCH 40 B.W.E, ASTM A 53, GR B        | 27) 8 - 5/8" x 3 3/4" STUDS                              |
| 2) 2 - 8" 90°, SEAMLESS CARBON STEEL, B.W.E, SCH 40             | 28) 1 - 4" GASKET, 1/8" THICK, RGR RUBBER, FULL FACE     |
| 3) 1 - 8" TEE " " " " " "                                       | 29) 1 - 8" GASKET, " " " " " "                           |
| 4) 2 - 8" 45° " " " " " "                                       | 30) 16 - 5/8" NUTS, HEAVY HEX, 2-H                       |
| 5) 4 - 8" FLANGES, CLASS 150, CARBON STEEL, FF, WN              | 31) 1 - FE-345E  |
| 6) 1 - 8" BUTTERFLY VALVES CLASS 150, LUG STYLE                 | 32) 1 - LCV-345C   |
| 7) 16 - 3/4" x 2 1/4" CAP SCREWS FOR 8" BUTTERFLY VALVE         | 33) 1 - FABRICATED MANHOLE COVER BY FIELD                |
| 8) 32 - 3/4" NUTS, HEAVY HEX NUTS                               | 34) 80' - 6" PIPE, STEEL, SCH 40, B.W.E, ASTM A 53, GR B |
| 9) 16 - 3/4" x 4 1/4" STUDS, B-7                                | 35) 140' - 4" PIPE, " " " " " "                          |
| 10) 1 - 3/4" x 8" T.O.L., STEEL, 3000#                          | 36) 2 - 4" BUTTERFLY VALVES, CLASS 150, LUG STYLE        |
| 11) 3 - 3/4" x 3" NIPPLES, C.S., SCH 40                         |  |
| 12) 3 - 3/4" BALL VALVES, CLASS 3000, C.S., THREADED            |  |
| 13) 2 - 8" x 6" CONC. RED. C.S., SCH 40, B.W.E                  |  |
| 14) 4 - 6" FLANGES, CLASS 150, CARBON STEEL, FF, WN             |  |
| 15) 1 - 6" TEE, SEAMLESS, CARBON STEEL, B.W.E, SCH 40           |  |
| 16) 1 - 6" x 4" " " " " " "                                     |  |
| 17) 7 - 6" 90° " " " " " "                                      |  |
| 18) 1 - 6" x 4" CONC. REDUCER " " " " " "                       |  |
| 19) 9 - 4" 90°, SEAMLESS " " " " " "                            |  |
| 20) 4 - 4" TEE, SEAMLESS " " " " " "                            |  |
| 21) 2 - 4" 90° " " SHORT RADIUS, " " " " FOR CONTAINMENT PIPING |  |
| 22) 2 - 8" 90° " " " " " " " " " "                              |  |
| 23) 2 - 3/4" x 4" T.O.L., STEEL, 3000#                          |  |
| 24) 5 - 4" FLANGES, CLASS 150, CARBON STEEL, FF, WN             |  |
| 25) 32 - 3/4" x 2" CAP SCREWS FOR 6" BUTTERFLY VALVES           |  |
| 26) 32 - 5/8" x 1 3/4" " " " " " " " " " "                      |  |



# TP-14

## BILL OF MATERIAL

- 1) 30' - 4" P.I.P.E., C.S., SCH#40, RWE
- 2) 60' - 6" P.I.P.E., " " " "
- 3) 6 - 6" 90° " " " "
- 4) 2 - 6" x 4" TEE " " " "
- 5) 4 - 4" 90° " " " "
- 6) 2 - 8" x 6" CONJ. ROD " "
- 7) 5 - 6" FLANGES, STEEL, #150, W.I., FF
- 8) 2 - 8" FLANGES, " " " "
- 9) 4 - 4" FLANGES " " " "
- 10) 2 - 6" BUTTERFLY VALVES, #150, LUG STYLE
- 11) 2 - 4" " " " "
- 12) 3 - 3/4" T.I.O.L., STEEL, 3000#
- 13) 3 - 3/4" x 3" NIPPLES
- 14) 9 - 3/4" BALL VALVES
- 15) 32 - 3/4" x 2" CAP SCREWS
- 16) 40 - 3/4" NUTS
- 17) 8 - 3/4" x 4" STUDS, B-7

- 18) 16 - 3/4" x 4 1/4" STUDS, B-7
- 19) 2 - 8" GASKETS, RR, FF
- 20) 1 - 6" GASKET, " " "
- 21) 1 - 6" TEE, C.S., SCH#40, RWE
- 22) 32 - 5/16" x 1 3/4" CAP SCREWS
- 23) 32 - 5/16" NUTS, 2-A
- 24) 4 - 3/4" TEES, C.S., 3000, SCH#40
- 25) 1 - 6" 45°, C.S., SCH#40, RWE

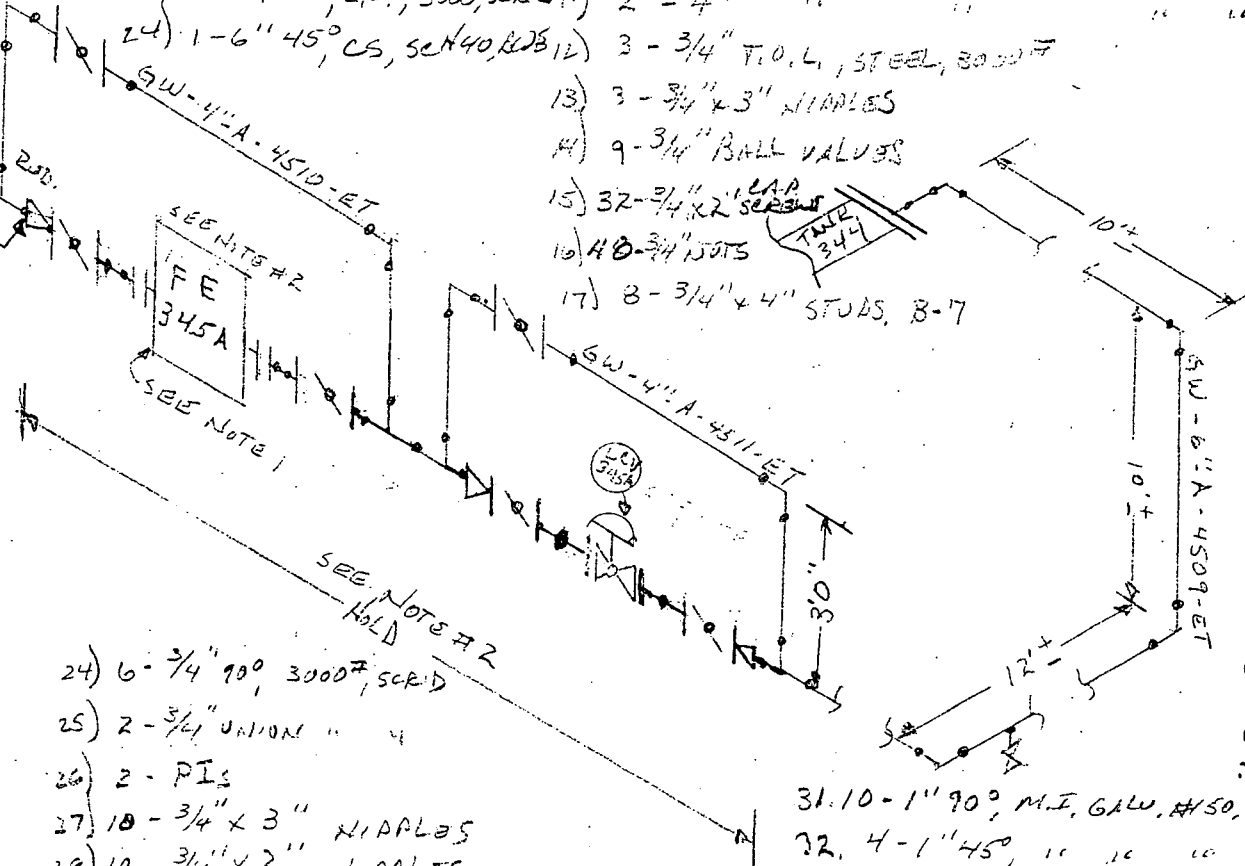
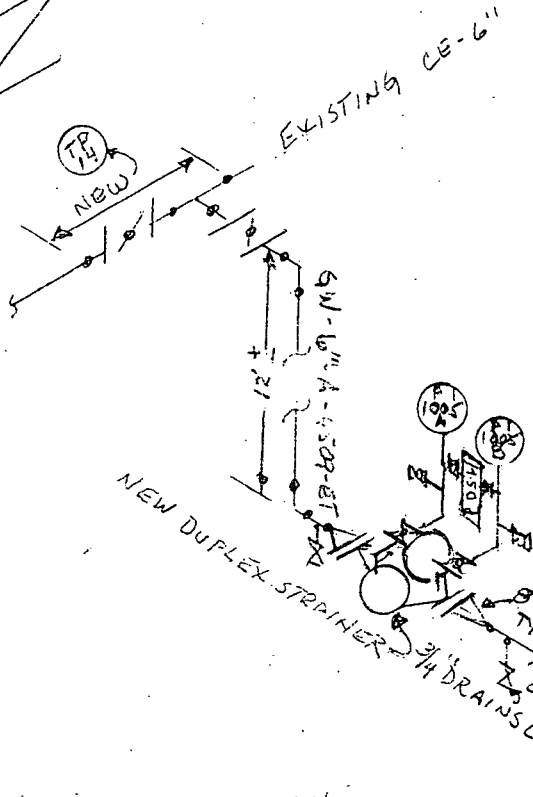
- 26) 6 - 3/4" 90°, 3000#, SCH#40
- 27) 2 - 3/4" UNION " " "
- 28) 2 - P.I.S.
- 29) 10 - 3/4" x 3" NIPPLES
- 30) 10 - 3/4" x 2" NIPPLES
- 31) 20 - 3/4" P.I.P.E., STEEL, SCH#40, SCAID
- 32) 40 - 1" P.I.P.E., STEEL, SCH#40, SCAID

31. 10 - 1" 90°, M.I., GALV., #50, SC.
32. 4 - 1" 45°, " " " "
33. 1 - 1" TEE, " " " "
34. 3 - 1" UNIONS, " " " "

## NOTES

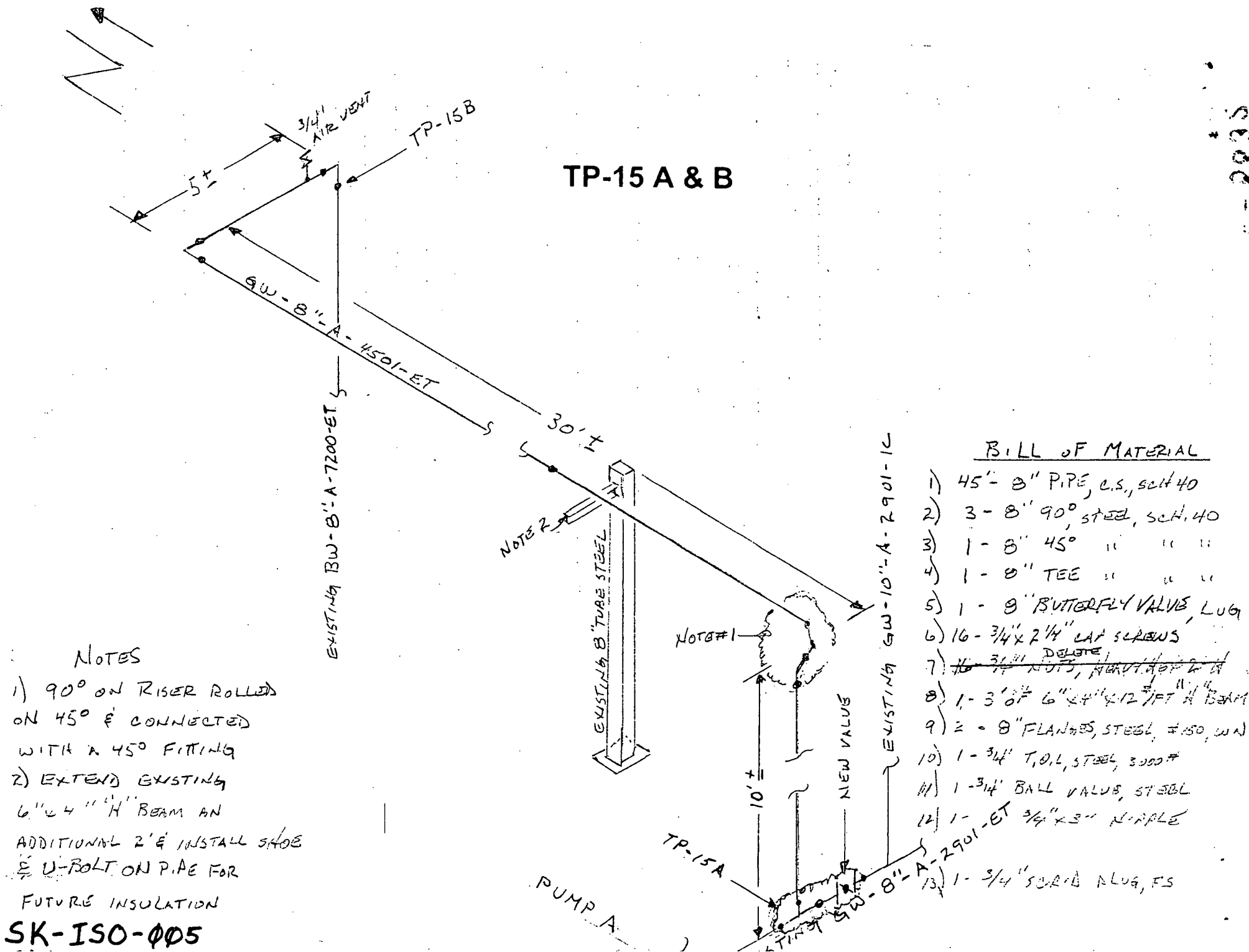
- 1) FABRICATE & ANCHOR PIPE SUPPORTS TO CONTAINMENT BASIN CONCRETE SLAB AS REQUIRED.
- 2) AWAITING INSTRUMENTATION SPEC FOR LINE SIZES FOR FE & LLV

SK-ISO-004  
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# TP-15 A & B



## NOTES

- 1) 90° ON RISER ROLLED ON 45° & CONNECTED WITH A 45° FITTING
- 2) EXTEND EXISTING 6" x 4" "H" BEAM AN ADDITIONAL 2' & INSTALL SHOE & U-BOLT ON PIPE FOR FUTURE INSULATION

SK-ISO-005

## BILL OF MATERIAL

- 1) 45' - 8" PIPE, C.S., SCH 40
- 2) 3 - 8" 90°, STEEL, SCH. 40
- 3) 1 - 8" 45° " " "
- 4) 1 - 8" TEE " " "
- 5) 1 - 8" BUTTERFLY VALVE, LUG
- 6) 16 - 3/4" x 2 1/4" LAF SCREWS
- 7) ~~16 - 3/4" NUTS, HARDENED~~
- 8) 1 - 3' 0" 6" x 4" x 12 1/2" I BEAM
- 9) 2 - 8" FLANGES, STEEL, #150, W.A.
- 10) 1 - 3/4" T.O.I.L, STEEL, 3000#
- 11) 1 - 3/4" BALL VALVE, STEEL
- 12) 1 - 3/4" ET 3/4" x 3" NIPPLE
- 13) 1 - 3/4" SCRB PLUG, FS

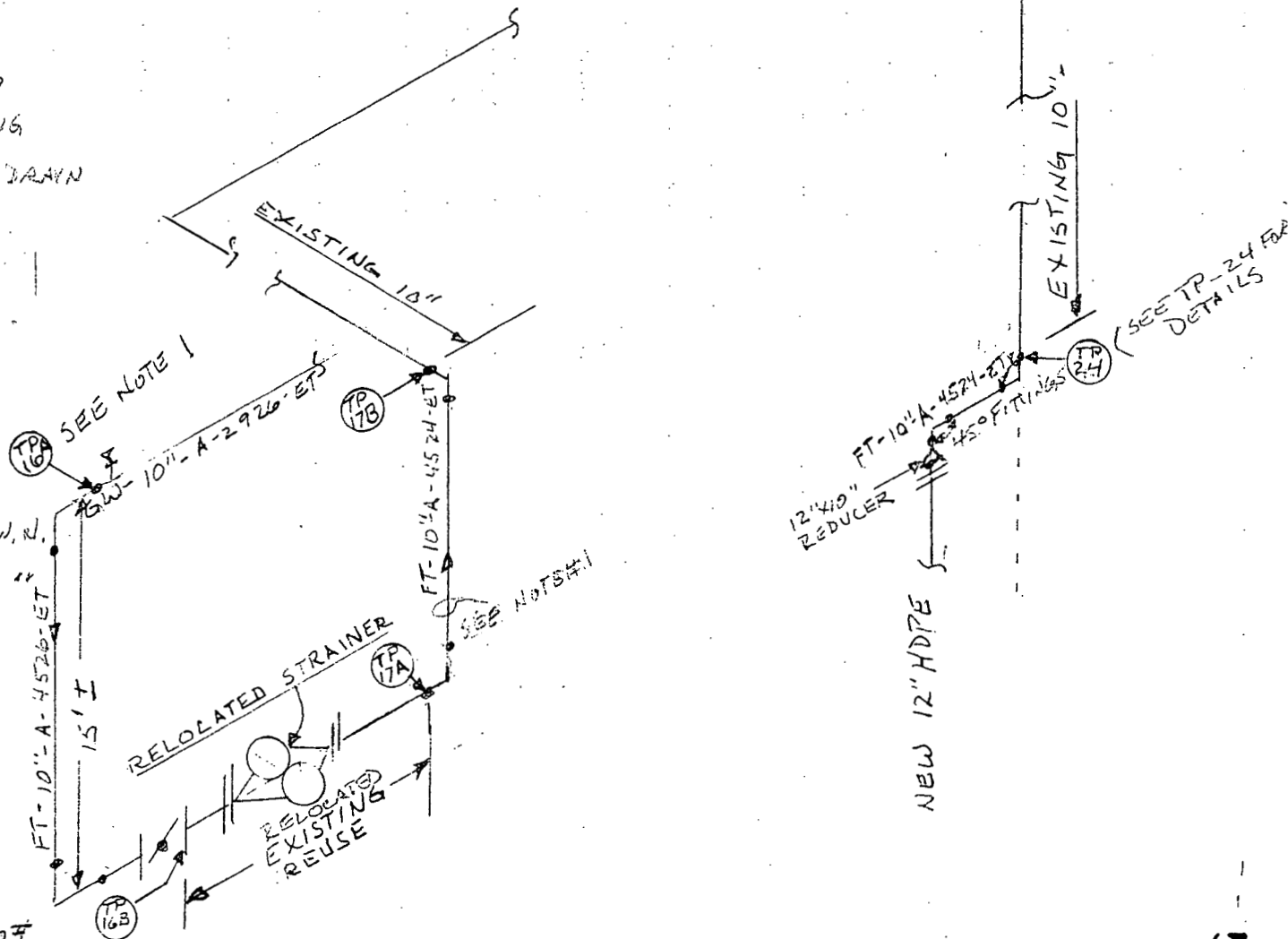
# TP 16, 16B, 17A, 17B 7 24 10" FT FOR RELOCATED STRAINER

## NOTES

- 1) SET DISCHARGE LINE FROM STRAINER ON CL FOR TP-17B & SUPPLY LINE ON CL OF TP-16
- 2) RUN EXISTING 1" DRAIN P.PING FROM STRAINER TO THE TRENCH DRAIN

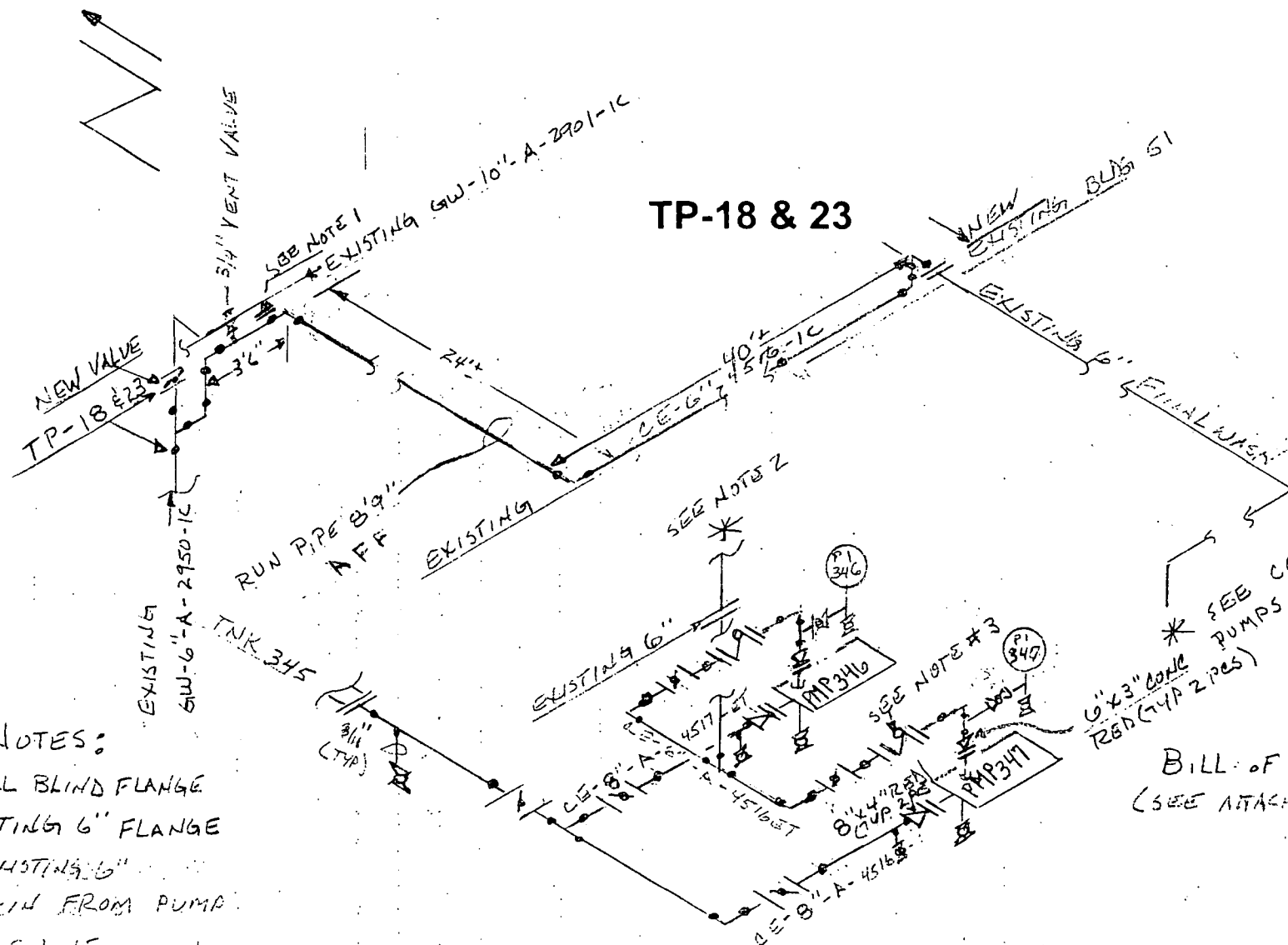
## BILL OF MATERIAL

- 1) 40'-10" P.P.E, STEEL, SCH. 40
- 2) 4- 10", 90°, STEEL, SCH. 40
- \* 3) 1- 12" x 10" CONCRETE
- 4) 1- 10", FLANGE, STEEL 150#, FT. W.N.
- \* 5) 1- 12" FLANGE, " " " "
- \* 6) 2- 10" 45°, STEEL, SCH. 40
- 7) 24 - 7/8" x 2 1/4" CAP SCREWS
- 8) 24 - 7/8" NUTS, 2 H
- 9) 1- 3/4" BALL VALVE
- 10) 1- 3/4" x 3" NIPPLE
- 11) 1- 3/4" P.P.E PLUG, SCH. 40
- 12) 1- 3/4" x 10" T.O.L., STEEL
- 13) 40'-1" P.P.E, STEEL, GALV. M.S., 150#
- 14) 6- 1" 90° " " " "
- 15) 1- 1" UNION " " " "
- 16) 1- 1" TEE " " " "
- 17) 1- 10" BUTTERFLY VALVE LUG STYLE



SK-ISO-006  
Sht. 1 8-10-04

5632



# NOTES:

- 1) INSTALL BLIND FLANGE ON EXISTING 6" FLANGE
- 2) USE EXISTING 6" FOR TIE-IN FROM PUMP DISCHARGE LINE.
- 3) USE 6", #150 RAISE FACE FLANGES TO MATE WITH CHECK VALVE

SK-ISO-007

Sh. 1

TP-18 & 23

BILL OF MATERIAL  
(SEE ATTACHED SHEET)

\* SEE CONTINUATION FOR  
PUMPS ON THIS DRAWING  
6" x 3" CONC  
RED (TYP 2 Pcs)

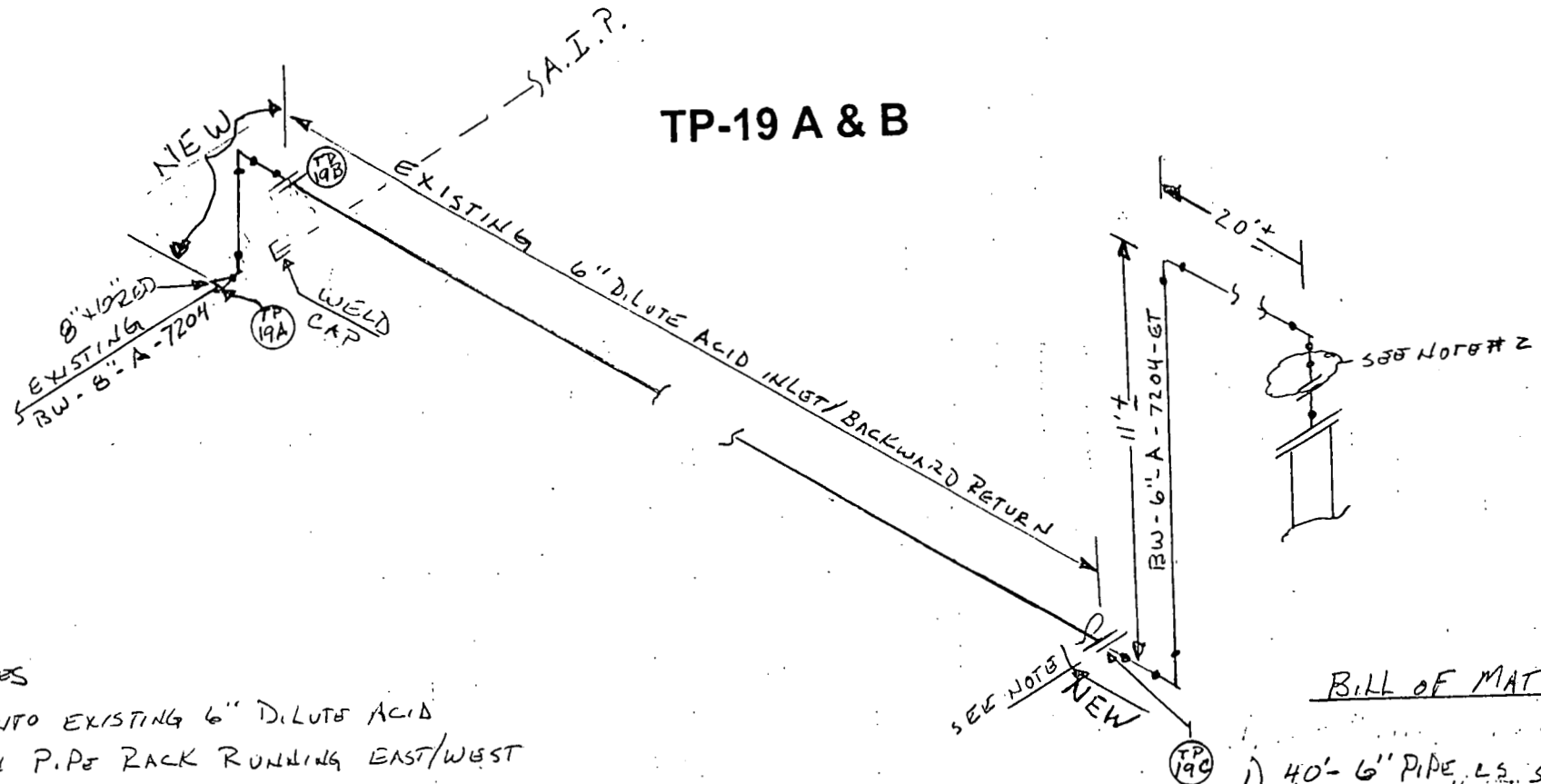
# BILL OF MATERIAL FOR TP-18 E 23

- 1) 20' - 8" PIPE, CARBON STEEL, ASTM A53, GRADE B, SCHEDULE 40, BUTT WELD ENDS
- 2) 80' - 6" PIPE, " " " " " " " " " "
- 3) 1 - 8" 90°, SEAMLESS CARBON STEEL, BUTT WELD ENDS, SCHEDULE 40
- 4) 1 - 8" TEE " " " " " " " " " "
- 5) 10 - 6" 90°, " " " " " " " " " "
- 6) 2 - 6" 45°, " " " " " " " " " "
- 7) 2 - 6" TEE " " " " " " " " " "
- 8) 7 - 8" FLANGES, CLASS 150, CARBON STEEL, FLAT FACE, ASTM A105 - WELD NECK
- 9) 7 - 6" FLANGES, " " " " " " " " " "
- 10) 5 - 3/4" x 3" T.O.L., CLASS 3000, SEAMLESS CARBON STEEL, ASTM A-105
- 11) 2 - 3/4" TEE, " " " " " " " " " "
- 12) 14 - 3/4" x 3" NIPPLE, "DITTO ITEM #1"
- 13) 10 - 3/4" BALL VALVES, CLASS 3000, CARBON STEEL, ASTM A105, SEAMLESS ENDS
- 14) 3 - 8" BUTTERFLY VALVES, CLASS 150, LUG STYLE
- 15) 3 - 6" BUTTERFLY VALVES, " " " " " " " " " "
- 16) 2 - 6" LITECK VALVES, CLASS 150, CAST STEEL, ASTM A216, SWING TYPE, 34
- 17) 48 - 3/4" x 2 1/4" CAP SCREWS 8" BUTTERFLY VALVES
- 18) 48 - 3/4" x 2" " " " " 6" BUTTERFLY VALVES
- 19) 8 - 3/4" x 4 1/4" STUDS, ASTM A193, GRADE B-7
- 20) 56 - 3/4" x 4" STUDS, " " " " " " " " " "
- 21) 120 - 3/4" NUTS, HEAVY HEX, ASTM A194, GRADE 2H
- 22) 2 - PIS - 346, 347
- 23) 1 - 6" BLIND FLANGE, CLASS 150, CARBON STEEL, FLAT FACE, ASTM A105,
- 24) 7 - 6" GASKETS, RED RUBBER, 1/8" THICK, FULL FACE
- 25) 1 - 8" GASKETS, " " " " " " " " " "
- 26) 2 - 8" x 4" CONC. RED., CS, B.W.E. SCH. 40
- 27) " " " " " " " " " "
- 28) 2 - 4" FLANGE, 150#, CS, FF, WELD NECK
- 29) 2 - 3" FLANGE, " " " " " " " " " "
- 30) 2 - 4" GASKET, 1/8" THICK, FF, RED RUBBER
- 31) 2 - 3" GASKET, " " " " " " " " " "
- 32) 24 - 5/8" x 3 3/4" STUDS, B-7
- 33) 48 - 5/8" HH NUTS, 2-H
- 34) 3 - 3/4" x 6" T.O.L., CLASS 3000, SEAMLESS, ASTM A105
- 35) 4 - 6" FLANGES, 150#, CS, RF, WELD NECK

SK-ISO-007  
Sht. 2 8-10-04

5632

# TP-19 A & B



## NOTES

- 1) TIE INTO EXISTING 6" DILUTE ACID LINE ON PIPE RACK RUNNING EAST/WEST
- 2) USE 6" SLIP-ON FLANGES FOR CONNECTING TO NEW MANWAY,

## BILL OF MATERIAL

- 1) 40'-6" PIPE, CS, SCH 40, B.W.E.
- 2) 5-6" 90° " " "
- 3) 1-8"x6" RWD, " " "
- 4) 4-6" FLANGES, CS, #150, FF,
- 5) 24-3/4"x4" STUDS,
- 6) 48-3/4" NUTS, B-7, HEAVY HD,
- 7) 3-6" GASKETS, RED RUBBER, FULL FACE, 1/8" THICK
- 8) 1-8" WELD CAP, STEEL, SCH. B.W.E.

Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 15190	Rev. 0

### 3.3 SCHEDULES

<u>Classification</u>	<u>Background Color</u>	<u>Letter/Arrow Color</u>
<b>Inherently Hazardous Materials</b>		
Radioactive (Leachate)	Yellow	Black
<b>Inherently Low Hazard Materials</b>		
Liquid or Liquid Admixture	Green	White
Gas or Gaseous Admixture	Blue	White
<b>Fire Quenching Materials</b>		
Water	Red	White

END OF SECTION


**Title: Specifications for the Converted Advanced  
Waste Water Treatment Facility**

**Specification No: 4518-TS-0011**

**Date: 08-12-04**

**Section 15260**

**Rev. 0**

Approved: 

## **SECTION 15260**

### **PIPING INSULATION**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Piping insulation.
- B. Jackets and accessories.

##### **1.2 SUBMITTALS FOR REVIEW**

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

##### **1.3 SUBMITTALS FOR INFORMATION**

- A. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

##### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section.

##### **1.5 REGULATORY REQUIREMENTS**

- A. Conform to maximum flame spread/smoke developed rating of 25/100 or less in accordance with ASTM E84.

##### **1.6 DELIVERY, STORAGE, AND PROTECTION**

- A. Material and Equipment: Transport, handle, store, and protect products.
- B. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

##### **1.7 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain ambient conditions required by manufacturers of each product.



Title: Specifications for the Converted Advanced Waste Water Treatment Facility	Specification No: 4518-TS-0011		
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## PART 2 PRODUCTS

### 2.1 GLASS FIBER

- A. Insulation: ASTM C547; rigid molded, noncombustible.
  - 1. 'K' value: ASTM C335, 0.24 at 75 degrees F.
  - 2. Minimum service temperature: -20 degrees F.
  - 3. Maximum service temperature: 300 degrees F.
  - 4. Maximum moisture absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket:
  - 1. White kraft paper with glass fiber yarn, bonded to aluminized film.
  - 2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
  - 3. Secure with self-sealing longitudinal laps and butt strips.
- C. Vapor Barrier Lap Adhesive:
  - 1. Adhesive shall be compatible with insulation.

### 2.2 FLEXIBLE CELLULAR ELASTOMERIC

- A. For anti-condensation, slit pipe or sheet in accordance with ASTM C534

### 2.3 JACKETS

- A. Aluminum Jacket: ASTM B209.
  - 1. Thickness: 0.025 inch sheet.
  - 2. Finish: Smooth or embossed.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.025 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

Title: Specifications for the Converted Advanced Waste Water Treatment Facility	Specification No: 4518-TS-0011		
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## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### **3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Inserts and Shields:
  - 1. Application: Piping 2 inches diameter or larger.
  - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  - 3. Insert location: Between support shield and piping and under the finish jacket.
  - 4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
- C. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- D. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

### **3.3 SCHEDULES**

- A. Piping Systems:
  - 1. Piping, Above Grade; outdoors
    - a. Glass Fiber Insulation:
      - 1) Thickness, thru 4 inch pipe size: 1 ½ inches.
      - 2) Thickness: Over 4 inch pipe size: 2 inches.
    - b. All outdoor piping to have aluminum jacket.
  - 2. Piping, Above Grade, Indoors
    - a. Flexible cellular elastomeric, 1 inch thick.

**END OF SECTION**

Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 16050	Rev. 0

Approved:  8/11/04**SECTION 16050****BASIC ELECTRICAL MATERIALS AND METHODS****PART 1 GENERAL****1.1 GENERAL**

- A. The Drawings and Specifications determine the general arrangement and locations of the equipment, conduit, and associated wiring of the electrical systems as covered in these Specifications.
- B. With the approval of Fluor Fernald, make all reasonable modifications as may be needed to prevent conflict with the Work of other trades and for proper execution of this Work.
- C. Inspect the area in which the Work is to be performed and note any obstructions to the placement of equipment or other material to be installed.

**1.2 DESCRIPTION OF WORK**

- A. The Work covered by these Specifications consists of the installation of all electrical equipment and systems, or partial systems, as shown on the Drawings and as specified herein. Furnish all labor and material required for the complete installation of the electrical equipment, systems and partial systems unless otherwise specified.
- B. Whenever the Drawings or Specifications require the installation of any apparatus or equipment, furnish any apparatus or equipment and, unless otherwise specified, connect same, test and leave it ready for operation.
- C. The installation shall be in strict accordance with the latest edition of the National Electrical Code (NFPA 70).

**1.3 REFERENCES**

- A. ANSI/NFPA 70 - National Electrical Code.
- B. NECA "Standard of Installation."
- C. UL - Underwriter's Laboratories
- D. OSHA - Occupational Safety and Health Administration

Title: Specifications for the Converted Advanced WasteWater Treatment Facility	Specification No: 4518-TS-0001		
	Date: 8-12-04	Section 16050	Rev. 0

#### 1.4 QUALITY ASSURANCE

- A. The Work shall be in strict conformance with these Drawings and Specifications. Follow the Drawings in routing out the Work where specific locations are given for conduits or equipment. Refer to all architectural, heating and ventilating, mechanical, piping, and structural drawings to verify the spaces in which all other Work will be installed.
- B. Unless otherwise noted on the Drawings or specified, all materials furnished shall be new, of industrial grade, and shall conform to the standards of the Underwriter's Laboratories, where such a standard has been established for the particular type of material.
- C. Installation workmanship shall be of the best quality and skill. The completed installation shall present a neat mechanical appearance.
- D. Gauges: Unless otherwise specified, all wire and cable sizes given in this Specification or on the Drawings shall be understood to be in American Wire Gauge, and thickness of metal in U.S.S. Sheet Steel Gauge.

#### 1.5 SUBMITTALS

- A. Submit product data for materials and equipment.

#### 1.6 PROJECT RECORD DOCUMENTS

- A. Provide "red lined" drawings showing "as-built" changes to the original drawings. They shall be given to Fluor Fernald at the time of contract completion.

#### 1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site.
- B. Inspect for damage.

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## 1.9 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.
- C. Do any cutting necessary for proper installation of electrical work and shall repair same.
- D. All penetrations through or removal of any asbestos materials shall be handled according to current Site rules and permits.
- E. Cutting, drilling, or tapping of building structural members shall not be permitted, except where approved by Fluor Fernald.

## PART 2 PRODUCTS

### 2.1 MATERIAL - GENERAL

- A. Furnish and install all materials required for the complete installation called for on the Drawings and in the Specifications except where otherwise noted. Upon receipt of electrical material and equipment, inspect, test, sign for, and assume full responsibility for damage or loss.
- B. All parts are generic description on the Drawings. Certain vendor part numbers are noted as aids to obtaining the correct materials and are not to imply that this is the only material acceptable. All materials are to be approved by Fluor Fernald.

### 2.2 CONDUIT - GENERAL

- A. Conduit shall be supported by approved conduit hangers.
- B. Conduit connections to motors on sliding bases or other electrical equipment subject to movement for position adjustment or subject to excess vibration shall be made with liquid-tight flexible conduit or Type SO cable, when noted on Drawings.
- C. Liquid-tight flexible conduit termination shall be made with a liquid-tight connector.
- D. Type SO cable shall be terminated in a sealing grip connector.

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### 2.3 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Rigid Aluminum Conduit: ANSI C80.5.
- C. Rigid Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit, aluminum fittings may be used with steel conduit.
- D. Electrical Metallic Tubing (EMT): ANSI C80.3; galvanized tubing.
- E. EMT Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron, compression or set screw type.

### 2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel or aluminum construction with PVC jacket.
- B. Fittings: ANSI/NEMA FB 1.

### 2.5 NONMETALLIC CONDUIT

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

### 2.6 FITTINGS, JUNCTION BOXES, AND PULL BOXES

- A. Fittings, junction boxes, and pulls installed outdoors shall be water-tight with rubber gasketed covers.
- B. Sheet metal junction boxes and pull boxes shall be galvanized steel unless otherwise shown or specified.
- C. Nuts, bolts, screws or other fastening devices used in the fabrication or installation shall be brass or cadmium plated steel unless otherwise noted.

### 2.7 WIRE AND CABLE

- A. All wires and cables shall be of the size shown on the Drawings and shall comply with the material specifications on the Drawings or as herein specified. All wires and cables shall be 600 volt rating, copper, type THWN unless otherwise shown on the Drawings or Specifications.

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- B. Power wiring shall be stranded unless otherwise shown or specified.
- C. Control wiring shall be stranded and shall be marked at each terminal with a permanent tag or adhesive marker and shall be marked in accordance with wiring diagram identification.
- D. Splices and taps shall be made with solderless cable connectors. Where cable connectors are used, it is important that all contact surfaces shall be cleaned to insure maximum conductivity.
- E. Stranded wire shall be terminated in screw type or crimped pressure lugs.

## 2.8 MOTOR CONTROL

- A. Motor starters shall be equipped with the proper sized overloads in accordance with motor nameplate data (obtained by field inspection) and the starter manufacturer's recommendations. Fluor Fernald approval is to be obtained for the overloads selected prior to their installation.
- B. Fuses for switches and combination starters and control circuits shall be dual element type of the voltage and ampere ratings indicated on the Drawings.

## 2.9 EQUIPMENT GROUNDING

- A. Equipment grounding conductors shall be copper, either bare or green color insulated. Where aluminum conduit is used, only green color insulated conductor is acceptable.

## 2.10 IDENTIFICATION

- A. Each item of electrical equipment, circuit breakers, switches, transformers, existing panels (T-189), etc., shall be identified by means of a white and black laminated plastic nameplate with black letters on white background. All wires shall be numbered with circuit breaker number and equipment with panel ID and circuit number.

## 2.11 INSPECTION AND TESTING

- A. Receptacle circuit tester: Leviton Model 6185 or approved equal.
- B. Insulation resistance test: 1,000 volt Biddle megger test set or approved equal.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION - GENERAL**

- A. Install work in accordance with the National Electric Code, NFPA 70.
- B. Comply with OSHA safety requirements during construction operations.

### **3.2 CONDUIT INSTALLATION**

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Conduits shall be continuous from outlet to outlet, and from fitting to fitting.
- E. Conduits shall be secured to all boxes and fittings in such a manner that each system shall be electrically continuous and mechanically secure from point of service to all outlets.
- F. Terminations of heavy wall conduit ends shall be furnished with two lock nuts and one insulating bushing, except where threaded into hubs.
- G. Hangers shall be attached with cinch anchors, toggle bolts or threaded connection, as required by the prevailing conditions. Existing conduit supports shall be used wherever practicable.
- H. Conduits shall in no case be secured directly to any piping or ducts, except where specifically noted as shown.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route conduit parallel and perpendicular to walls using right angle bends, except where specifically shown or noted on Drawings.
- K. Route conduit in and under slab from point-to-point.
- L. Do not cross conduits in slab.
- M. Maintain 3 inches minimum clearance between conduit and piping.
- N. Maintain 12 inches clearance between conduit and surfaces with temperatures exceeding 104 degrees F.



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- O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- R. The length of flexible conduit or SO cable shall be held to the minimum required to provide the necessary movement.
- S. When SO cable is used, one conductor (green) is to be utilized for a ground.
- T. Use conduit bodies to make sharp changes in direction, as around beams.
- U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- W. Provide suitable pull string in each empty conduit except sleeves and nipples.
- X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Y. Right angle turns or tees shall consist of symmetrical bends or cast fittings. Bends and offsets shall be avoided wherever possible. Field bends shall be made so as to avoid changing the internal diameter of the conduit and so as not to damage the internal or external protective coating. Bends and offsets shall be free from kinks, indentations, or flattened surfaces and shall be made with approved conduit bending machines or devices. The use of heat in bending metallic conduits shall not be permitted.
- Z. Extreme care shall be exercised to prevent the accumulation of water, concrete or other foreign materials in conduits during execution of the Work. Conduits in which foreign material has accumulated shall be thoroughly cleaned. Where such accumulations cannot be removed by methods approved by Fluor Daniel Fernald, the conduit run shall be replaced.
- AA. Conduit unions or other threaded couplings shall be used where required. Split and welded couplings, running threads or other makeshift methods of joining heavy wall conduits shall not be permitted except where specifically shown on the Drawings.

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### 3.3 FITTINGS, JUNCTION BOXES, AND PULL BOXES

- A. All necessary fittings, junction boxes, and pull boxes required for complete installation shall be installed whether shown on the Drawings or not.

### 3.4 WIRE AND CABLE

- A. Wires and cables shall be installed in a conduit system after the conduit system has been completely installed. Wires and cables shall not be taped or tied together, except for pulling purposes, prior to pulling in conduit unless otherwise shown on the Drawings or specified.
- B. Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet boxes, junction boxes, or wiring troughs.  
**Exception:** Fixture drops from "T" type conduit fittings, ground wire, and in junction fittings adjacent to small coil devices without splice box.
- C. Splices shall be properly insulated and shall provide insulation not less than that of the insulation of the conductors.
- D. The best care shall be exercised while installing wire in conduit so as not to injure the conductor insulation. No oil, grease, or compound other than an approved wire pulling compound shall be used in pulling conductors.
- E. Panel wiring shall be done in neat and workmanlike manner. Control wiring shall be installed in a wiring channel or formed and tied to present a neat mechanical appearance.
- F. Wire insulation may be any color with the exception that white or gray shall be used for neutrals only and green shall be used for equipment grounding only.

### 3.5 MOTOR CONTROL

- A. Adjustable circuit breakers of combination starters so equipped shall be adjusted to the lowest setting which will permit the motors to start. All poles shall be set to the identical set point.

### 3.6 EQUIPMENT GROUNDING

- A. All electrical equipment, including panelboards, junction boxes, safety switches, etc., shall be securely grounded. Existing grounding systems shall be retained and utilized as appropriate.
- B. Under no circumstances shall conduit be used as an equipment grounding conductor.

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- C. Equipment grounding conductors, where not otherwise specified, shall be sized in accordance with the National Electric Code. Grounding electrode conductor shall be sized per NEC Table 250-94.
- D. In all buildings, the conduit system, piping, metallic tubing and all other members which may act as a current carrying path to ground shall be effectively bonded together to keep the electrical potential differential essentially at or very near zero.

### 3.7 IDENTIFICATION

- A. Nameplates shall be properly attached to equipment and so located as to be visible from the front. Nameplates shall be attached by screws where practical.
- B. Furnish and install all nameplates where Drawings call for labeling equipment.

### 3.8 INSPECTION AND TESTING

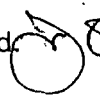
- A. All electrical equipment, materials and systems installed in the facility shall be thoroughly tested for satisfactory operation in accordance with applicable industry standards and as herein specified to determine compliance with the Drawings and Specifications.
- B. Wire and cable shall be visually inspected prior to installation for faulty insulation. Before connection to equipment, all wire shall be tested for resistance to ground.
- C. Visually inspect all field connections for proper phasing and connections. Phasing to be A, B, C clockwise at all three phase disconnects.
- D. Furnish all test equipment for the proper and safe conductance of all tests. Repair or replace all circuit components where test values are unacceptable. The repair or replacement of circuit components damaged during testing will not constitute a reason for Contract revision.
- E. All testing shall be performed in the presence of and with the approval of Fluor Fernald QC and, where applicable, the manufacturer's service engineer. All parties shall be notified in writing seven (7) days in advance of any tests to be performed to allow ample time for them to arrange their schedule for witnessing the test.
- F. Perform continuity and operational tests on receptacle, power and control circuits.
- G. Check all control and interlocking wiring for proper operation. Perform operational tests with Fluor Fernald to assure that wiring has been properly installed.

- H. Perform insulation resistance test on 480 volt circuits and on motors phase to ground after installation and before energizing. Investigate causes and take remedial action when insulation resistance tests indicate a significant downward trend in the resistance readings. Insulation resistance shall be one megohm or greater.
- I. Do not perform insulation resistance test of circuits operated at or below 120 volts, on solid state equipment, static ground fault devices, including ground fault circuit interrupters, or on any circuit connected to equipment containing solid state devices, unless such test is authorized by, and is performed in strict accordance with equipment manufacturer's recommendations.
- J. All test and calibration data must be recorded on approved data sheets and submitted to Fluor Fernald for review. All gauges must be calibrated and traceable to the National or NIST Standards.

**END OF SECTION**

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**SECTION 16170**  
**GROUNDING AND BONDING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.

**1.2 RELATED SECTIONS**

- A. Section 16050 - General Electrical Requirements

**1.3 REFERENCES**

- A. ANSI/NFPA 70 - National Electrical Code.

**1.4 GROUNDING ELECTRODE SYSTEM**

- A. Existing Metal underground water pipe.
- B. Existing Metal frame of the building.
- C. Existing Ground ring
- D. Rod electrode.

**1.5 PERFORMANCE REQUIREMENTS**

- A. Grounding System Resistance: 5 ohms.

**1.6 SUBMITTALS**

- A. Submit under provisions of Section 16001.
- B. Product Data: Provide data for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

#### **1.7 PROJECT RECORD DOCUMENTS**

- A. Submit under provisions of Section 16001.
- B. Accurately record actual locations of grounding electrodes.

#### **1.8 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

### **PART 2 PRODUCTS**

#### **2.1 ROD ELECTRODE**

- A. Manufacturers:
1. Copperweld
  2. Joslyn #J8350
  3. Burndy
  4. Substitutions: Approved Equal.
- B. Material: Copper.
- C. Diameter: 3/4 inch.
- D. Length: 10 feet.

#### **2.2 MECHANICAL CONNECTORS**

- A. Manufacturers:
1. Erico.
  2. Burndy.
  3. Ilsco.
  4. Substitutions: Approved Equal by the Electrical Engineer.
- B. Material: Bronze.

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## 2.3 EXOTHERMIC CONNECTIONS

### A. Manufacturers:

1. Erico - Cadweld
2. Substitutions: Approved Equal by the Electrical Engineer.

## 2.4 WIRE

### A. Material: Stranded copper.

### B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- #### A. Verify that final backfill and compaction has been completed before driving rod electrodes.

### 3.2 INSTALLATION

- #### A. Install Products in accordance with manufacturer's instructions.
- #### B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- #### C. Provide bonding to meet NFPA 70 Requirements.
- #### D. Permanent grounding shall be provided for all stationary tanks. This grounding shall consist of a bare grounding conductor, #2 AWG, tinned copper attached to tank as shown in detail on drawing and extended to:
1. First Preference - Existing building ground station or earth electrode subsystem utilizing a thermic connector such as Cadweld.
  2. Second Preference - New ground rod installation as per detail shown on drawings.
- #### E. Clean all surfaces to bright metal before making thermic weld connections.
- #### F. Pipe insulation shall be sealed with weather-seal around grounding lugs. Benjamin foster foam seal #30-45.

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- G. Where metal structures exist above paved areas the grounding conductor from the vertical steel column shall extend to either an existing ground grid or to an adjacent unpaved area where ground rods shall be driven.
- H. Transformer Neutral Grounding, the secondary neutrals of all 120/240VAC, single-phase, and 208Y/120VAC, three-phase lighting transformers shall be grounded in accordance with section 250-26 of the NEC.
- I. Electrical plans will show structures to be grounded and ground cable runs when necessary.
- J. If additional ground rods are necessary to achieve the required 5 ohms resistance, then the spacing between rods shall be a minimum of 6 feet. Preferably in the shape of a triad.
- K. Bond together reinforcing steel and metal accessories in structures. All underground connections shall be made by the thermic method such as Cadwell.
- L. Bond together each metallic raceway, pipe, duct and other metal object associated with the sludge removal system. Any other metal objects within 6 feet shall be bonded to the sludge removal system. Use #2 AWG bare copper conductor.
- M. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

### 3.3 FIELD QUALITY CONTROL

- 1. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- 2. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall- of-potential method.

**END OF SECTION**



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Approved:  8/11/04**SECTION 16370****OVERHEAD POWER DISTRIBUTION****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Poles and crossarms.
- B. Pole hardware.
- C. Overhead line conductors.
- D. Pole mounted distribution transformers.

**1.2 REFERENCES**

- A. ANSI/IEEE C2 - National Electrical Safety Code
- B. ANSI C29.2 - Insulators - Wet-Process Porcelain and Toughened Glass - Suspension Type.
- C. ANSI C29.3 - Wet-Process Porcelain Insulators - Spool Type.
- D. ANSI C29.4 - Wet-Process Porcelain Insulators - Strain Type.
- E. ANSI C29.5 - Wet-Process Porcelain Insulators - Low and Medium Voltage Type.
- \_\_\_ F. ANSI C29.7 - Wet-Process Porcelain Insulators - High- Voltage Line-Post Type.
- G. ANSI C37.42 - Specifications for Distribution Cutouts and Fuse Links.
- H. ANSI C135.1 - Galvanized Steel Bolts and Nuts for Overhead Line Construction.
- I. ANSI C135.2 - Threaded Galvanized Ferrous Strand-Eye Anchor Rods and Nuts for Overhead Line Construction.
- J. ANSI C135.4 Galvanized Ferrous Eyebolts and Nuts for Overhead Line Construction.
- K. ANSI C135.5 - Galvanized Ferrous Eynuts and Eyelets for Overhead Line Construction.

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- L. ANSI C135.17 - Galvanized Ferrous Bolt-Type Insulator Pins with Lead Threads for overhead Line Construction.
- M. ANSI C135.22 - Galvanized Ferrous Pole-Top Insulator Pins with Lead Threads for Overhead Line Construction.
- N. ANSI C135.30 - Galvanized Ferrous Ground Rods for Overhead or Underground Line Construction.
- O. ANSI C135.31 - Galvanized Ferrous Single and Double Upset Spool Insulator Bolts for Overhead Line Construction.
- P. ANSI 05.1 - Specifications and Dimensions for Wood Poles.
- Q. ASTM A475 - Zinc-Coated Steel Wire Strand.
- R. ASTM A675 - Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
- S. ANSI/ASTM B1 - Hard-Drawn Copper Wire.
- T. ANSI/ASTM B2 - Medium-Hard-Drawn Copper Wire.
- U. ASTM B3 - Soft or Annealed Copper Wire.
- V. ASTM B8 - Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
- W. ANSI/ASTM B228 - Concentric-Lay-Stranded Copper-Clad Steel Conductors
- X. ANSI/ASTM B232 - Concentric-Lay-Stranded Aluminum Conductors, Coated-Steel Reinforced (ACSR).
- Y. AWWA C4 - Standard for the Preservative Treatment of Poles by the Pressure Process.
- Z. AWWA C25 - Standard for the Preservative Treatment of Crossarms by the Pressure Process.
- AA. FS TT-W-571 - Wood Preservation: Treating Practices.
- BB. NEMA LA1 - Surge Arrestors.
- CC. ANSI/UL 96 - Lightning Protection Components
- AD. ANSI C57.12.20 - Overhead type transformers 500 KVA and smaller.

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### 1.3 SYSTEM DESCRIPTION

- A. Overhead distribution line consisting of two circuit operating at 13.2 kV, as shown on Drawings.

### 1.4 DESIGN REQUIREMENTS

- A. Comply with ANSI/IEEE C2, heavy loading conditions, Grade B construction.

### 1.5 SUBMITTALS

- A. Submit product data indicating materials and construction of hardware and line conductors.

### 1.6 PROJECT RECORD DOCUMENTS

- A. Accurately record exact locations of poles, guys, anchors, and required horizontal and vertical clearances.

### 1.7 QUALITY ASSURANCE

- A. Installer: Company specializing in applying work of this Section with minimum three years experience.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Accept poles and hardware on site and inspect for damage.
- B. Protect poles from damage and decay by stacking to provide free circulation of air. Maintain one foot (300 mm) minimum spacing between bottom pole and ground or ground vegetation. Do not store poles above decayed or decaying wood.
- C. Stack poles stored for more than two weeks on decay-resistant skids arranged to support poles without noticeable pole distortion.
- D. Handle treated poles with tools which will not produce an indentation greater than one inch (25 mm) deep. Do not drag treated poles along ground. Do not apply tools to that section of treated poles between one foot (300 mm) above and 2 feet (600 mm) below ground line.

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## PART 2 PRODUCTS

### 2.1 POLES

- A. Wood Poles: ANSI 05.1; treated Southern pine poles of 45 feet length minimum (check drawings for required length), Class II minimum.
- B. Select poles for straightness and minimum sweeps and short crooks.
- C. Preservative: ANSI D.51 and AWP A C-4 (.38# Pentachlorophenol).
- D. Apply preservative to AWP A C4 with minimum net retention of 12 lbs/cu ft (285 kg/cu m). Obtain complete sapwood penetration.

### 2.2 CROSSARMS

- A. Crossarms and Timbers: Straight-grained [Douglas fir] [Southern pine], free of twists to within 0.1 inch per foot (8 mm per m) of length, with bends and twists in only one direction.
- B. Apply preservative to poles to AWP A C25 with minimum net retention of 8 lbs/cu ft (190 kg/cu m).
- C. Crossarm Dimensions: 4.25 x 5.25 inches x 9 feet.

### 2.3 POLE HARDWARE

- A. Miscellaneous Pole Hardware: Hot-dipped galvanized after fabrication.
- B. Crossarm Braces: Structural steel zinc coated to ASTM A675.
- C. Angle Braces: 60 inch span x 18 inches (1.5 m span x 450 mm), drop-formed in one piece from 1-3/4 x 1-3/4 inch (45 x 45 mm) angle.
- D. Flat Braces: 1/4 x 1-1/4 inch (6 x 32 mm).
- E. Eye Bolts and Nuts: ANSI C135.4.
- F. Anchor Rods and Nuts: ANSI C135.2
- G. Bolts and Nuts: ANSI C135.1
- H. Eyenuts and Eyelets: ANSI C135.5.
- I. Ground Rods: ANSI C135.30.

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- J. Butt Plate: Copper.
- K. Bolt-type Insulator Pins: ANSI C135.17.
- L. Pole-top Insulator Pins: ANSI C135.22
- M. Spool Insulator Bolts: ANSI C135.31.
- N. Hot-line Clamps: Screw type with concealed threads. Fill thread chamber with corrosion-resistant compound.
- O. Secondary Racks: Furnish with spool insulators.
- P. Guy Strand: High strength 7-strand steel cable galvanized to ASTM A475, Class A or B.
- Q. Guy Termination: Automatic, Preformed or Three-bolt clamp type.
- R. Guy Guards: 8 foot (2 m) long Plastic, colored yellow.
- S. Ground Wire: Soft drawn copper conductors, 4 AWG minimum size.
- T. Air Terminal: ANSI/UL 96; 10 inch high copper air terminal.

## 2.4 INSULATORS

- A. Insulators: Radio interference free wet process porcelain insulators with minimum wet flashover rating of 80 kV.
- B. Line Post Insulators: ANSI C29.7; Class 57.1.
- C. Suspension Insulators: ANSI C29.2; Class 52.9.
- D. Pin Insulators: ANSI C29.5; Class 55.5.
- E. Guy Strain Insulators: ANSI C29.4; Class 54.2.

## 2.5 LINE CONDUCTORS

- A. Medium Voltage Overhead Line Conductors: Bare aluminum conductor steel reinforced.
- B. Secondary Conductors: Aluminum multi-conductor cable with 600 volt cross-linked polyethylene insulation for phase conductors. Use bare ACSR messenger for neutral.

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## 2.6 ARRESTERS AND CUTOUTS

- A. Surge Arresters: NEMA LA1; valve type, arranged for crossarm mounting, and rated 10 kV.
- B. Fused Cutouts: ANSI C37.42; drop-out load break fused cutouts rated 200 mperes at 14.4 kV ungrounded.
- C. Fuses: Type K rated as indicated.

- 2.7 Pole Mounted Distribution Transformer: single phase mineral oil filled, shelf cooled with primary bushings and secondary terminations, 125 kV BIL, temperature rise of 65EC above 30EC ambient, ratings as indicated. Transformers shall be rated for 20.5 kV wye /13.2 kV delta, connected delta primary and wye secondary. Provide primary taps with externally-operated tap changer.

- 2.8 Helical Screw Anchors: Galvanized steel, size as noted.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that site is ready to receive work.
- B. Verify field measurements are as shown on Drawings.
- C. Verify that required utilities are available, in proper location and ready for use.
- D. Beginning of installation means installer accepts existing conditions.

### 3.2 INSTALLATION

- A. Plug unused holes in poles using treated wood dowel pins. Treat field-cut gains and field-bored holes with preservative.
- B. Poles shall be set within plus or minus 1 foot transversely of the location indicated on the Drawings.
- C. Dig setting holes with a diameter not less than the pole diameter at the butt plus 12 inches, unless noted otherwise. Sufficient space shall be left around each pole to allow for efficient tamping and compaction of backfill.
- D. Pole shall be set within 3 inches of the depth specified in the table.

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- E. Vertical alignment of all poles shall be within 3 inches of plumb or the amount of rake indicated on the Drawings.
- F. Backfill material shall be native soil. Soil shall be free of debris, organic material and rock larger than 1 inch size. Soil shall have a moisture content that will ensure good compaction.
- G. Place earth in maximum 12 inch layers. Tamping shall be done with air tampers only. Earth shall be banked around each pole to a height of 12 inches above grade.
- H. Identify each pole using aluminum marker stamped with characters 2-1/2 inches (60 mm) high minimum. Locate to provide maximum visibility [from roadway] and fasten with aluminum nails. Obtain identifying numbers from drawings.
- I. Set crossarms at right angles to line for straight runs; and to bisect the angle of turns in line direction.
- J. Provide two braces for each crossarm where possible due to pole hardware, install one brace minimum.
- K. Install conductors to ANSI/IEEE C2.
- L. Use small diameter steel pipe to verify area is free of underground obstructions prior to installations of anchors.

### 3.3 POLE SETTING SCHEDULE

- A. Minimum depths in normal firm ground, measured from lower side of pole:

<u>OVERALL LENGTH</u>	<u>DEPTH - STRAIGHT LINES</u>	<u>DEPTH - CURVES</u>
40'	6'-0"	7'-0"
45'	6'-6"	7'-6"
50'	7'-0"	8'-0"
55'	7'-6"	8'-6"
60'	8'-0"	9'-0"
65'	8'-6"	9'-6"
70'	9'-0"	10'-0"
75'	9'-6"	10'-6"
80'	10'-0"	11'-0"
85'	10'-6"	11'-6"
90'	11'-0"	12'-0"

**END OF SECTION**

**SECTION 16462**

**PAD-MOUNTED TRANSFORMERS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Dry-type pad-mounted transformers.

**1.2 RELATED SECTIONS**

- A. Section 16050 – "Basic Electrical Materials and Methods"
- B. Section 16170 – "Grounding and Bonding"

**1.3 REFERENCES DRAWINGS**

- A. See Section 16050 from Parsons Specification Project Order 178, RES #3376, WBS No. 1.1.1.5.2 for the listing of Electrical drawings.

**1.4 REFERENCES**

- A. IEEE C57.12.01 – Standard General Requirements for Dry-Type Distribution and Power Transformers.
- B. ANSI C57.12.22 - Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers with High Voltage Bushings; 2,500 kVA and Smaller: High Voltage, 34,500 GrdY/19,920 volts and Below; Low Voltage, 480 Volts and Below – Requirements..
- C. ANSI C57.12.26 – Standard for Transformers – Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for use with Separable insulated High Voltage Connectors: high Voltage, 34,500 Grdy/19,920 Volts and below; 2,500 kVA and Smaller.
- D. ANSI C57.12.28 – Switchgear and Transformers, Pad-Mounted Equipment – Enclosure Integrity.
- E. ANSI C57-12.50 – Requirements for Ventilated Dry-Type Distribution Transformers, 1-500 kVA Single-Phase and 15-500 kVA Three-Phase, with High Voltage 601-34,500 volts, Low Voltage 120-600 Volts.
- F. IEEE C57.12.51 – Requirements for Ventilated Dry-Type Power Transformers, 501 kVA and larger Three-Phase, with High Voltage 601-34,500 Volts, Low Voltage 208Y/120-4, 160 Volts.



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- G. IEEE C57.12.90 – Standard Test Code for Liquid-Immersed Distribution Power, and Regulating Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers (ANSI).
- H. IEEE C57.12.91 – Test Code for Dry-Type Distribution and Power Transformers.
- I. IEEE – C57.13 – Requirements for Instrument Transformers.
- J. ANSI/IEEE 386 – Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.
- K. ASTM D877 – Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
- L. NEMA AB1 – Molded Case Circuit Breakers.
- M. CAN/CSA-C88-M90 – Electrical Power Systems and Equipment.
- N. NFPA 70

#### 1.5 SYSTEM DESCRIPTION

- A. Dry Type pad – mounted transformers shall have primary voltage of 13.2 kV and secondary voltage of 480 V and shall be used in a 3 phase, 60 Hertz system.
- B. The system is 13.2 kV phase-to-phase.
- C. The transformer will be wired delta primary and wye secondary.

#### 1.6 SUBMITTALS

- A. Submit shop drawings indicating outline dimensions, connection and support points, weight, specified ratings and materials.
- B. Submit product data indicating standard model design tests and options.
- C. Submit manufacturer's installation instructions.

#### 1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data.
- B. Include procedures for sampling and maintaining fluid, cleaning unit, and replacing components.

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## 1.8 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in distribution transformers with three years documented experience.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect dry-type transformers from moisture by using appropriate heaters as instructed by the manufacturer.
- B. Inspect transformer on-site for damage..
- C. Store in a clean dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirty water, construction debris, and traffic.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer's internal components, enclosure, and finish.

## PART 2 PRODUCT

### 2.1 MANUFACTURERS

- A. Square D Company
- B. General Electric
- C. Siemen

### 2.2 VPI DRY-TYPE PAD-MOUNTED TRANSFORMERS

- A. The transformer(s) shall be compartment type, self-cooled, for mounting on a pad and shall comply with the latest applicable standards.
- B. Transformer coils shall be of the continuous wound construction and impregnated utilizing the VPI process. The coils shall be preheated and subjected to a dry vacuum of no less than 29.7 inches of mercury. Precatalyzed resin shall be introduced into the coil with vacuum maintained during the process. The coils shall then be subjected to a pressure of 75 psi for a suitable length of time to provide complete impregnation of the coils with no voids or air pockets which can create hot spots or cause corona formation. The coils shall then be cured in ovens forming non-hydroscopic coils with a minimum 23-mils coating over Nomex® insulated conductors. The coils shall be wound with copper conductors.

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- C. All transformers shall have a maximum temperature rise of 115° C above 40° C maximum ambient.
- D. Primary taps shall be full capacity, with a minimum of two 2-1/2% above and below rated voltage.
- E. kVA sizes and voltages shall be as shown on the electrical plans or on the transformer schedule.
- F. The basic impulse levels (BIL) shall be a minimum of 95 kV BIL for the 15 kV class. Primary and secondary BIL shall be 95 kV and 10 kV respectively.
- G. All coils shall be constructed of high grade, grain oriented, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. Core laminations shall be miter cut at the core corners to reduce hot spots, core loss, excitation current, and sound level. The laminations shall be clamped together utilizing insulated bolts through the core laminations to provide proper pressure throughout the length of the core.
- H. Provision shall be made to completely isolate the core and coil from the enclosure. There shall be no metal-to-metal contact. Rubber vibration isolation pads shall be installed by the manufacturer between the core and coil and the enclosure base. The core shall be visibly grounded to the ground bus or ground pad by means of a flexible grounding conductor sized in accordance with applicable NEC standards.
- I. Dry-type transformers shall be mounted in a heavy gauge sheet steel enclosure consisting of three isolated sections, high voltage compartment, low voltage compartment, and transformer compartment on a common base to form an integral load center. The enclosure is to be of NEMA Type 3R rated rain-resistant construction. Indoor enclosures with weather shields are not acceptable.
- J. The high voltage termination section shall be dead front and conform to ANSI C57.12.26 requirements. (Available options include hook-stick operated and individual-pole load break fused disconnects with current limiting fuses as required according to drawings.)
- K. The low voltage termination section shall contain spade type terminals with standard NEMA type hole patterns. (Available options include main breaker and panelboard with or without main breaker as required according to drawings.)
- L. The enclosure base is to be constructed of structural steel members to permit rolling or skidding in any direction. The base shall also be provided with lifting devices and jacking pads designed to be flush with the enclosure.

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- M. Access to the transformer section is to be through a removable panel equipped with padlock hasps to prevent entry by unauthorized personnel when padlocks are installed. Entrance to the high voltage compartment shall not be possible until the low voltage compartment door is open and interlocking screws are released. The low voltage compartment shall have 3-point latching and padlocking provisions.
- N. Any parts of the enclosure that do not have padlocking provisions shall be secured with either tamper resistant hardware or carriage bolts with nuts inside the enclosure to prevent removal by unauthorized personnel.
- O. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning, and phosphatizing, followed by electrostatic deposition of a polymer polyester powder coating and baking cycle to provide uniform, weather-resistant coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be green.
- P. Metal-oxide, gapless-type distribution class lightning arresters shall be installed by the manufacturer on the high voltage side of the transformer to provide additional protection against high voltage lightning or switching surges.
- Q. Transformers are to be manufactured and tested in accordance with IEEE standards C57.12.01, C57.12.91, C57.12.50, and C57.12.51, and shall include, as a minimum, the following tests:
1. Ratio
  2. Polarity
  3. Phase Rotation
  4. No Load Loss
  5. Excitation Current
  6. Impedance Voltage
  7. Load Loss
  8. Applied Potential
  9. Induced Potential
  10. QA Impulse Test

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- R. The high voltage compartment dead front bushings shall be universal wells or one-piece integrated type for use with separable connectors. Bushings shall be externally cleaned and front removable.
- S. The wye transformer secondary voltage neutrals shall be internally tied with a removable strap.
- T. A ground pad shall be provided.
- U. Each transformer shall be furnished with a permanent stainless steel nameplate in the low voltage compartment.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that pads are ready to receive work.
- B. Verify field measurements are as shown on drawings and instructed by manufacturer.
- C. Verify that required utilities are available, in proper location and ready for use
- D. Beginning of installation means installer accepts conditions.

#### **3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install safety labels to NEMA 260.

#### **3.3 FIELD QUALITY CONTROL**

- A. Check for damage and ensure that all connections are tight prior to energizing transformer.
- B. Measure, record, and provide written report to FDF for primary and secondary voltage and make the appropriate tap adjustments.

#### **3.4 ADJUSTING**

- A. Adjust primary taps so that secondary voltage is within 2% of rated voltage.

**END OF SECTION**

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## SECTION 16470

### PANELBOARDS

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. Extent of panelboard, and enclosure work, including cabinets and cutout boxes is indicated by Contract Drawings and schedules.
- B. Types of panelboards and enclosures in this section include lighting and power distribution panelboards.

##### 1.2 QUALITY ASSURANCE

###### A. Codes and Standards

1. NEC Compliance: Comply with NEC for panelboards, cabinets, and cutout boxes. Comply with NEC requirements pertaining to installation of wiring and equipment in hazardous locations.
2. UL Compliance: Comply with requirements of Std No. 67, "Electric Panelboards," and Stds No.'s 50, 869, 486A, 486B, and 1053 pertaining to panelboards, accessories and enclosures. Units shall be UL listed and labeled
3. NEMA Compliance: Comply with NEMA Stds Pub/No. 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)," Pub/No. PB12, "Panelboards," and Pub/No. PB1.1, "Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or less."
4. Federal Specification Compliance: Comply with FS W-P-115, "Power Distribution Panel," pertaining to panelboards and accessories.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURER

- A. Square D Co.

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## 2.2 PANELBOARDS

- A. Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicate, which comply with manufacturer's standard materials. Design and construction shall be in accordance with published product information; equip with proper number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for those applications indicated
- B. Lighting, Panelboards: Provided dead-front safety type panelboards as indicated, with switching and protective devices in quantities, ratings, types and arrangements shown. Panelboards shall be provided with anti-burn solderless pressure type lug connectors approved for copper conductors. Provide units for connecting feeders at top of panel. Equip panel with copper bus bars, full-sized neutral bar, with plug on type heavy-duty, quick-make, quick-break, single-pole circuit breakers, with toggle handles that indicate when tripped. Provide suitable lugs on neutral bus for each outgoing feeder required; provide bare uninsulated grounding bars suitable for bolting to enclosures except in conditioned load panels where the grounding bar shall manufacturer as panelboards, which mate properly with enclosures.
- C. Panelboard Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gage, minimum 16 gage thickness. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed piano door hinges and door swings as indicated Equip with interior circuit directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor coating. Provide enclosures fabricated by same manufacturer as panelboards, which mate properly with panelboards to be enclosed.
- D. Panelboard Accessories: Provide panelboard accessories and devices including, but not necessarily limited to, circuit breakers, ground-fault protection units, etc., as recommended by panelboard manufacturer for ratings and applications indicated.
- E. Bus: The bus in each panelboard shall be the size noted on the drawing. Each panel board shall accept branch circuit breakers of the same rating as the panelboard bus size.
- F. Lighting panelboards will be Square D NQOD as basis of design.

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## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Installer must examine areas and conditions under which panelboards and enclosures are to be installed and notify Fluor Daniel Fernald in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to FDF.
- B. Fasten circuit breakers without mechanical stress, twisting, or misalignment being exerted by clamps, supports, or cabling.

### 3.2 INSTALLATION

- A. Install panelboards and enclosures as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC Standards and NECA's "Standard of Installation," and in compliance with recognized industry practices to ensure that products fulfill requirements.

### 3.3 METHOD

- A. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std's 486A and B.
- B. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.
- C. Provide properly wired electrical connections within enclosures.
- D. Type panelboard's circuit directory card upon completion of installation work.
- E. Provide insulated copper equipment grounding conductors to all panelboards. Tighten connections to comply with tightening torques specified in UL Std's 486A and B to assure permanent and effective grounds.
- F. Prior to energization of circuitry, check all accessible connections to manufacturer's tightening torque specifications.
- G. Prior to energization of panelboards, check with ground resistance tester phase-to phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.



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- H. Prior to energization, check panelboards for electrical continuity of circuits, and for short-circuits.
- I. Subsequent to wire and cable hook-ups, energize panelboards and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

**END OF SECTION**

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## SECTION 16475

### OVERCURRENT PROTECTIVE DEVICES

#### PART 1 GENERAL

##### 1.1 SCOPE

- A. This specification covers fuses and circuit breakers.

##### 1.2 CODES AND STANDARDS

- A. NEC Compliance: Comply with NEC requirements pertaining to overcurrent protective devices.
- B. UL Compliance: Comply with UI 489, "Molded Case Circuit Breakers and Circuit Breakers Enclosures," and UL 198D, "High Interrupting Capacity Class K Fuses." Provide overcurrent protective devices which are UL listed and labeled.
- C. NEMA Compliance: Comply with NEMA Std Pub/No.'s AB1, AB2, and SG3 pertaining to molded case and low voltage power type circuit breakers.
- D. ANSI Compliance: Comply with ANSI C97.1 pertaining to low voltage cartridge fuses.
- E. FS Compliance: Only with Federal Specification W-C-375B/GET pertaining to molded case circuit breakers.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURER

- A. Provide overcurrent protective devices of one of the following (for each type and rating of overcurrent protective devices):
  - 1. Circuit Breakers:
    - a. Square D Co.
  - 2. Fuses:
    - a. Bussman Div.
    - b. McGraw-Edison
    - c. General Electric Co.
    - d. Gould, Inc.

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## 2.2 CIRCUIT BREAKERS

- A. Install circuit breakers and ancillary components, of types, sizes, ratings, and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation.

## 2.3 MOLDED CASE CIRCUIT BREAKERS

- A. Install factory assembled, molded case circuit breakers of frame size, rated amperes, voltage, poles, with symmetrical ampere interrupting rating as indicated on Contract Drawings. Install breakers with permanent thermal and instantaneous magnetic trips in each pole, ampere ratings as indicated. Construct with overcenter, trip free, toggle type operating mechanisms with quick make, quick break action and positive handle trip indication. Install push to trip button on cover for mechanical tripping circuit breakers. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40 degrees C. Install breakers with mechanical screw type removable connector lugs, AL/CU rated. Breakers shall be plug on type

# PART 3 EXECUTION

## 3.1 METHODS

- A. Install overcurrent protective devices as indicated on Contract Drawings, in accordance with manufacturer's written instructions and with recognized industry practices. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Fasten circuit breakers without mechanical stress, twisting, or misalignment being exerted by clamps, supports, or cabling.
- C. Set field adjustable circuit breakers for trip settings as indicated, subsequent to installation of units. Deliver and store units so test settings are not altered.
- D. Install fuses, if any, in fused disconnect switches.
- E. Inspect circuit breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

## 3.2 TESTS

- A. Test devices for continuity of circuitry and for short circuits prior to energization of overcurrent protective devices. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise remove and replace with new units and proceed with retesting.

**END OF SECTION**

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## SECTION 16855

### HEATING CABLES

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Heating cable.
- B. Temperature controllers for heating cable.

##### 1.2 PERFORMANCE REQUIREMENTS

- A. Pipe Trace Heating: Freeze protection with outside temperature -20 F.

##### 1.3 SUBMITTALS

- A. Product Data: Submit catalog information for products specified.
- B. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Chromalox
- B. Furon Co./ Decoron
- C. Raychem.
- D. Approved equal.

##### 2.2 HEATING CABLE

- A. Heating Cable: Self-limiting, 120 volt AC, parallel resistance heating cable, capacity to maintain 40 F cold water temperature at -20 F ambient and 1 ½ inch insulation thickness.

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## 2.3 ACCESSORIES

- A. Provide thermostat to deactivate heating cable when outside temperature exceeds 50 F.
- B. Monitor Light: Neon bulb, red lens, in liquid tight junction box. Indicated power on condition.

## 2.4 CAPACITY

- A. Follow these guidelines for cable wattage and maximum circuit length:

<u>Pipe Size</u>	<u>Cable Wattage</u>	Maximum Length	Maximum Length
		<u>20A, 120V</u>	<u>30A, 120V</u>
1 ½ inch & smaller	3 watts/ft.	265	330
1 ½ inch to 3 inch	5 watts/ft.	185	270
3 inch to 6 inch	8 watts/ft.	130	200
8 inch	10 watts/ft.	105	155
10 & 12 inch	15 watts/ft.	90	135

## PART 3 EXAMINATION

### 3.1 EXAMINATION

- A. Verify that piping is ready for use.
- B. Verify that circuit breaker in lighting panel is available and ready for use.
- C. Verify heating cable continuity and is free of damage prior to insulation installation. Fluor Fernald QA to witness.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

END OF SECTION

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Approved: 

## SECTION 16095

### MINOR ELECTRICAL DEMOLITION

This section includes basic methods for demolition and repair of disrupted existing electrical work.

This section includes performance, proprietary, and description type specifications.

#### PART I – GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
2. Disposal of materials
3. Storage of removed materials
4. Identification of utilities
5. Salvaged items.
6. Protection of items to remain (as scheduled at end of section) (as indicated on Drawings).
7. Relocate existing equipment to accommodate construction.

##### 1.2 QUALITY ASSURANCE

- ###### A. Perform Work in accordance with Site Standards.

##### 1.3 SCHEDULING

- ###### A. Schedule work to coincide with new construction.

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#### 1.4 COORDINATION

- A. Conduct demolition to minimize interference with adjacent (and occupied) building areas.
- B. Coordinate demolition work with Fluor Fernald personnel.
- C. Coordinate and sequence demolition so as not to cause shutdown of operations of surrounding areas.
- D. Identify salvage items in cooperation with Owner.

### PART 2 – PRODUCTS

Not Used

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- A. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.
- B. Verify termination points for demolished services.

#### 3.2 PREPARATION

- A. Erect, and maintain temporary safeguards, (including warning signs and lights,) (barricades,) (and similar measures,) for protection of the employees, and existing improvements to remain.
- B. Temporary egress signage and emergency lighting when required.

#### 3.3 DEMOLITION

- A. Remove exposed abandoned conduit. Cut conduit flush with walls and floors (, and patch surfaces).
- B. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation.
- C. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

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- D. Reconnect equipment being disturbed by renovation work and required for continue service to electrical panels with site construction manager's approval.
- E. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit and wiring, which are not part of final project.
- F. Install temporary wiring and connections to maintain existing system in service during construction.
- G. Perform work on energized equipment or circuits with experienced and trained personnel.
- H. Remove, relocate, and extend existing installations to accommodate new construction.
- I. Repair adjacent construction and finished damaged during demolition and extension work.
- J. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components (including abandoned components above accessible ceiling finished). Cut embedded support elements flush with walls and floors.
- K. Clean and repair existing equipment to (remain) (or) (to be installed).
- L. Protect and retain power to existing active equipment remaining.
- M. Cap abandoned empty conduit at both ends.

#### 3.4 EXISTING PANELBOARDS

- A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse. Install new breakers.
- B. Tag unused circuits as spare.
- C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.
- D. Remove existing wire no longer in use from panel to equipment.
- E. Provide new updated directories where more than three circuits have been modified or rewired.



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### 3.5 SALVAGE ITEMS

- A. Remove and protect items indicated on Drawings to be salvaged and turn over to construction manager.
- B. Items of salvageable value may be removed as work progresses.

### 3.6 REUSABLE ELECTRICAL EQUIPMENT

- A. Carefully remove equipment, materials, or fixtures which are to be reused.
- B. Disconnect, remove, or relocated existing electrical material and equipment interfering with new installation.
- C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

### 3.7 CLEANING

- A. Keep workplace neat.

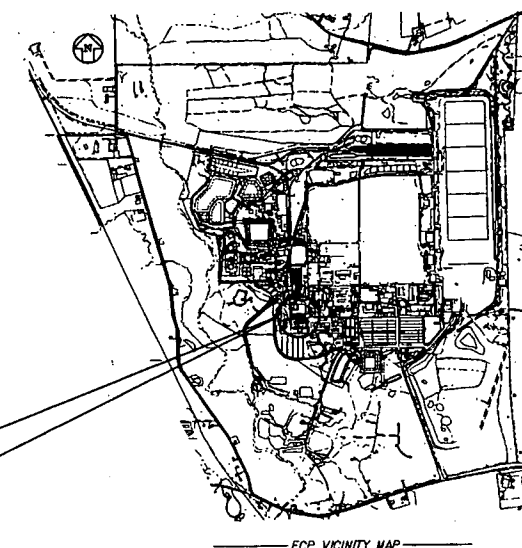
### 3.8 SCHEDULES

- A. Remove, store and protect the facility materials and equipment to maintain construction schedule:

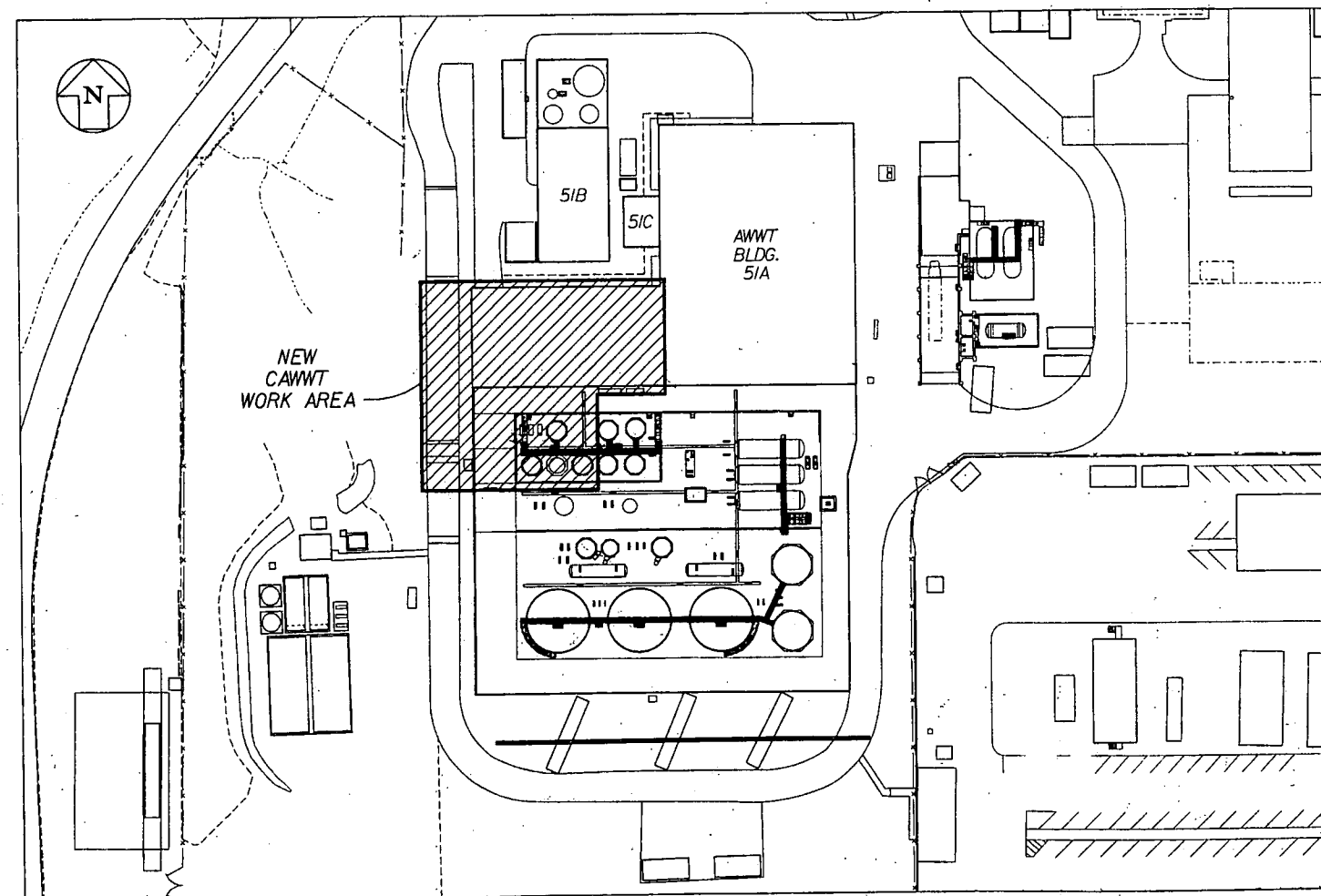
**END OF SECTION**

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RES 4518



—FCP VICINITY MA

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NOTE:  
FLUOR FERNAL  
CADD DRAWING  
DO NOT REVISE  
MANUALLY.

**CONFIGURATION  
MANAGEMENT  
DRAWING**

SYSTEMS, STRUCTURES, OR COMPONENTS  
IDENTIFIED IN THIS DRAWING ARE TO BE  
CONFIGURATION MANAGEMENT CONTROLLED.  
SEE NOTES.

ORIGINATOR ENGINEER DATE

APPROVALS			
CIVIL & STR.		SAFETY ENG.	
ELECTRICAL		MAINTENANCE	
ENGINEER		FIRE PROTECT.	
INSTRUMENT		WASTE MANAGE.	
MECHANICAL		SECURITY	
		PROJECTS	
CHECKED	156261		
APPROVED	G Paul		

Fernald Closure Project

**FLUOR FERNALD, INC.**

U.S. DEPARTMENT OF ENERGY

BLDG. 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
-----------	--------------------------------------

CONVERTED AWWT (CAWWT)  
MASTER COVER SHEET

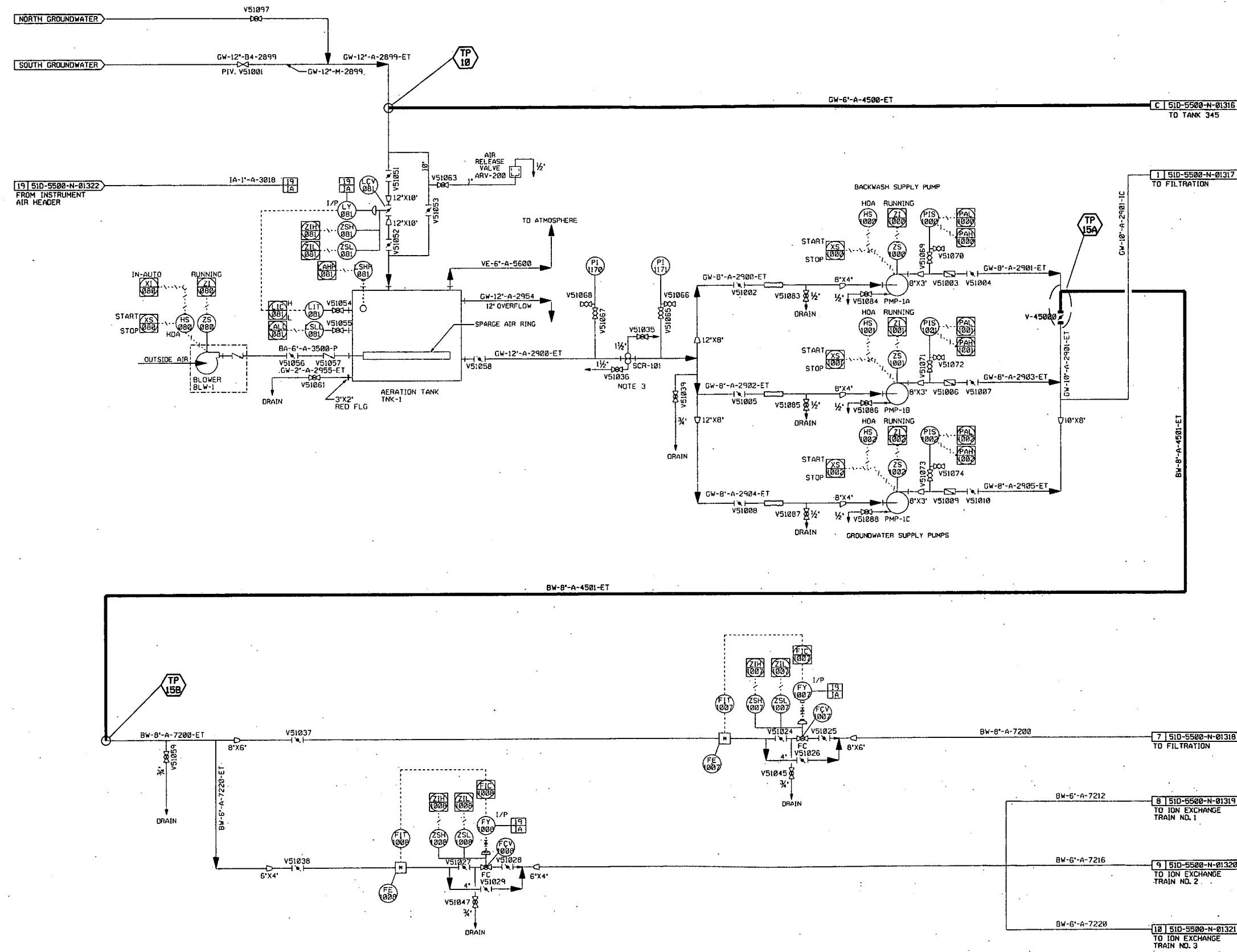
RES #4518
DATE 4/5/04
ORIGIN SLSMOCK

51D-5500-X-01324	0
------------------	---

FILE NAME: /RES4518/CAWWT/SIDX1324.DGM



5632



- MODIFICATION NOTES:**
1. ALL INSTRUMENTS WILL BE TIED TO THE CAWWT CONTROL SYSTEM (CAWWT PLC). MOTOR OPERATED EQUIPMENT WILL RECEIVE A RUN CONTACT FROM THE PLC AND HAVE A CONTACT FOR INDICATION OF RUNNING AT THE PLC.
  2. PUMPS AND STRAINER SHALL BE HEAT TRACED AND INSULATED. NOZZLES, NIPPLES AND VALVES ASSOCIATED WITH AERATION TANK'S LEVEL TRANSMITTER AND LOW LEVEL SWITCH SHALL BE HEAT TRACED AND INSULATED.
  3. HAYWARD MODEL 50 DUPLEX STRAINER, 12" BUCKET, 316 SS, 1/8" PERFORATIONS, (EXISTING).

NEW  
EXISTING

REF. DWG.S  
510-5500-N-01322  
510-5500-N-01323  
510-5500-X-01324

NO.	REVISIONS	DATE	BY	APPD.	NO.	REVISIONS	DATE	BY	APPD.	NO.	REF. DWG. NO.

NOTE:  
FLUOR FERNALD  
CADD DRAWING  
DO NOT REVISE  
MANUALLY.

CONFIGURATION  
MANAGEMENT  
DRAWING  
REVISIONS  
1. ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION  
2. 90% REVIEW  
3. 60% REVIEW

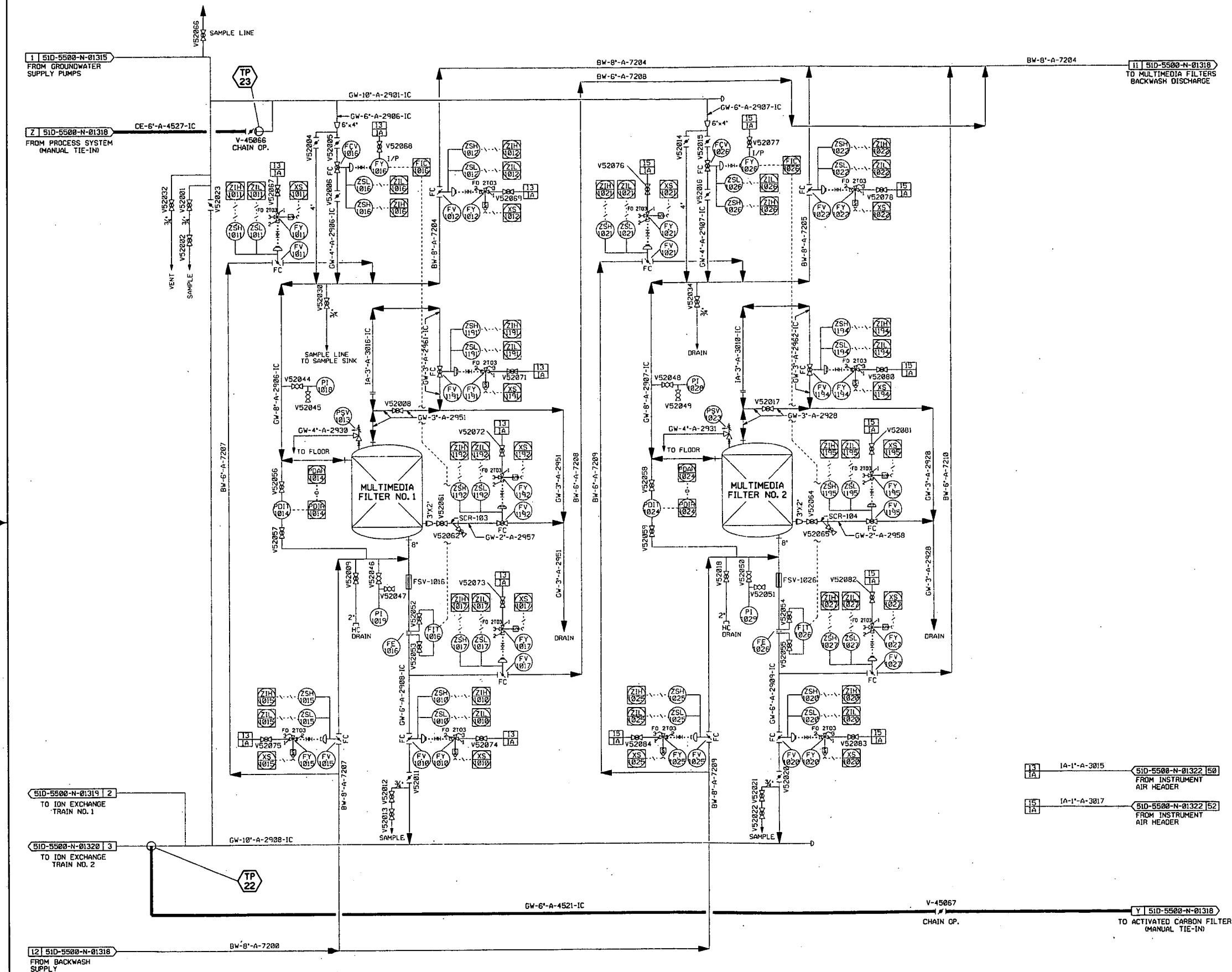
APPROVALS	DATE	CHECKED	APPROVED
CIVIL & STR.			
ELECTRICAL			
ENGINEER			
INSTRUMENT			
MECHANICAL			

**Fernald Closure Project**  
**FLUOR FERNALD, INC.**  
**U.S. DEPARTMENT OF ENERGY**

PROJECT NO. 59600  
BLOC. 51A  
ADVANCED WASTEWATER TREATMENT (AWWT)  
CONVERTED AWWT (CAWWT)  
PIPING & INSTRUMENTATION DIAGRAM  
SHT. 1 OF 8  
510-5500-N-01315  
0

FILE NAME: /RES4518/CAWWT/51DN315.DGN





**MODIFICATION NOTES:**

1. ALL INSTRUMENTS WILL BE CONTROLLED BY THE CAWWT CONTROL SYSTEM (CAWWT PLC).

NEW  
EXISTING

REF. DWG.S  
5ID-5500-N-01322  
5ID-5500-N-01323  
5ID-5500-X-01324

													SID-5500-N-01321
													SID-5500-N-01320
													SID-5500-N-01319
													SID-5500-N-01318
						B	ISSUED FOR CAWWT 'STAGE I' CONSTRUCTION		M/M	JMG			SID-5500-N-01316
						O	90% REVIEW		M/M	SJS			SID-5500-N-01315
						A	60% REVIEW		M/M	SJS			95X-9900-N-0028
NO.	REVISIONS	DATE	DWN.	BY	APPD.	NO.	REVISIONS	DATE	DWN.	BY	APPD.	NO.	REF. DWG. NO.

NOTE:  
FLUOR FERNAL  
CADD DRAWING  
DO NOT REVIS  
MANUALLY.

**CONFIGURATION  
MANAGEMENT  
DRAWING**

SYSTEMS, STRUCTURES OR COMPONENTS  
IDENTIFIED IN THIS DRAWING ARE UNDER  
CONFIGURATION MANAGEMENT CONTROL.  
SEE NOTES.

COGNIZANT ENGINEER . DAT

APPROVALS			
CIVIL & STR.		SAFETY ENG.	
ELECTRICAL		MAINTENANCE	
ENGINEER		FIRE PROTECT.	
INSTRUMENT		WASTE MANAGE	
MECHANICAL		SECURITY	
		PROJECTS	
CHECKED	15-2-78		
APPROVED	G. Burt		

Fernald Closure Project

**FLUOR FERNALD, INC.**

U.S. DEPARTMENT OF ENERGY

PROJECT NO. 59600

BLDG 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
----------	--------------------------------------

CONVERTED AWWT (CAWWT)

CONVERTED AWWT (CAWWT)  
 DURING A INSTRUMENTATION DIAGRAM

### PIPING & INSTRUMENTATION DIAGRAM

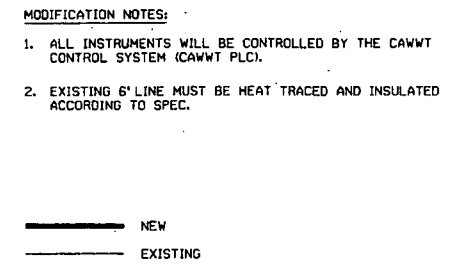
SHT. 3 OF 8

RES #4518	51D-5500-N-01317	0
DATE 3/25/04		

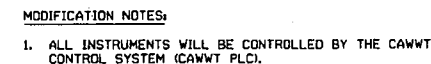
DRAWN	S. J. SMOCK	SID. 3500 N. 61ST	9
-------	-------------	-------------------	---

ECPS-DCN 5/30/03

The diagram shows a horizontal rectangular structure divided into seven equal segments. Above the structure, the segments are labeled from left to right as 0', 1', 2', 3', 4', 5', and 6'. The total length is indicated as 6m and the width as 1m.



PROJECT NO. 59600	
BLDG. 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
CONVERTED AWWT (CAWWT) PIPING & INSTRUMENTATION DIAGRAM SHT. 4 OF 8	
RES #450 DATE 3/23/04 DRAWN S.J.SWICK	510-5500-N-01318 0
FILE NAME: \\RFS4508\CAWWT\5101N18.DGN	



NEW

EXISTING

BLDG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)  
 CONVERTED AWWT (CAWWT)  
 PIPING & INSTRUMENTATION DIAGRAM  
 SHT. 5 OF 8

SHT. 5 OF 8

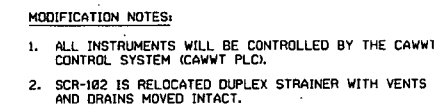
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DATE 3/25/04		

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PROJECT NO. 59600		
BLDG. 51A		ADVANCED WASTEWATER TREATMENT (AWWT)
CONVERTED AWWT (CAWWT)		
PIPING & INSTRUMENTATION DIAGRAM		
SHT. 6 OF 8		
RES #458		
DATE	3/25/04	
DRAWN	S.J. SMOCK	
51D-5500-N-01320		0



NEW

EXISTING

RES #458	51D-5500-N-01321	0
DATE 3/25/04		
SEARCHED E JENCKY		

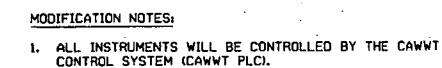
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														S/D-5500-N-01319				
														S/D-5500-N-01318				
														S/D-5500-N-01317				
						O	ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION				1/2/01	JMG	S/D-5500-N-01316					
						B	90% REVIEW				1/5/01	SJS	S/D-5500-N-01315					
						A	60% REVIEW				1/10/01	SJS	95X-5900-N-00283					
NO.	REVISIONS		DATE		OWN.	BY	APPD.	NO.	REVISIONS		DATE		OWN.	BY	APPD.	REF.	OWG.	NO.

COGNIZANT ENGINEER DATE

APPROVALS			
CIVIL & STR.		SAFETY ENG.	
ELECTRICAL		MAINTENANCE	
ENGINEER		FIRE PROTECT.	
INSTRUMENT		WASTE MANAGE.	
MECHANICAL		SECURITY	
		PROJECTS	
CHECKED	<i>JSW For</i>		

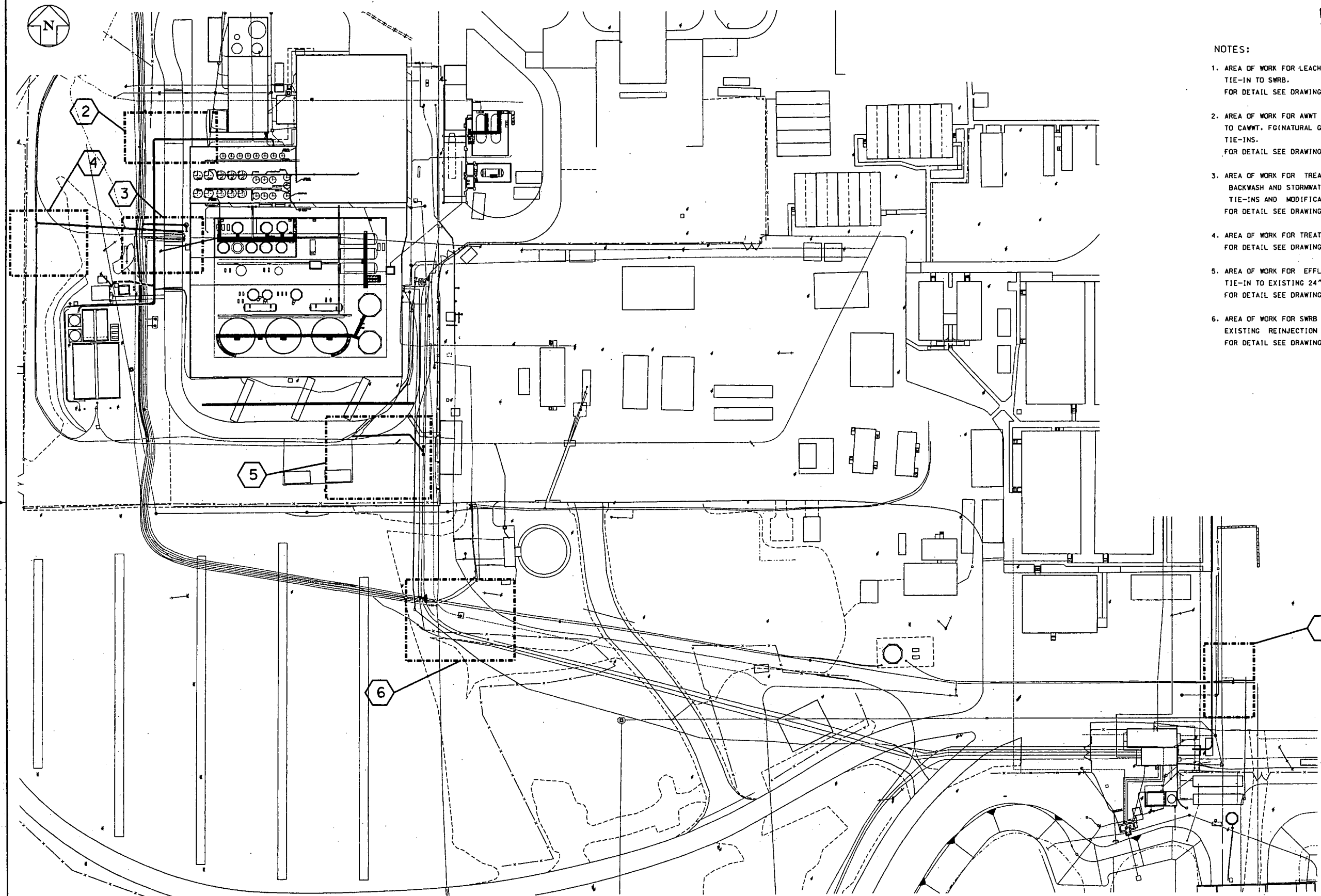
U.S. DEPARTMENT OF ENERGY



NEW  
EXISTING

PROJECT NO. 59600	
BLDG. 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
CONVERTED AWWT (CAWWT) PIPING & INSTRUMENTATION DIAGRAM SHT. 8 OF 8	
RES. *45B DATE 3/25/04 DRAWN S.-J.SMOOK	51D-5500-N-01322 0

3. AREA OF WORK FOR LEACHATE AND BACKWASH TIE-IN TO SWRB.  
FOR DETAIL SEE DRAWING 51D-5500-P-01328.
2. AREA OF WORK FOR AWWT EXCAVATION EFFLUENT TO CAWWT, FG(NATURAL GAS) AND DW(POTABLE WATER) TIE-INS.  
FOR DETAIL SEE DRAWING 51D-5500-P-01328.
3. AREA OF WORK FOR TREATED EFFLUENT, BACKWASH AND STORMWATER TO TREAT, TIE-INS AND MODIFICATIONS.  
FOR DETAIL SEE DRAWING 51D-5500-P-01329.
4. AREA OF WORK FOR TREATED EFFLUENT TIE-IN.  
FOR DETAIL SEE DRAWING 51D-5500-P-01329.
5. AREA OF WORK FOR EFFLUENT AND WPA WELLS TIE-IN TO EXISTING 24" TO GWR.  
FOR DETAIL SEE DRAWING 51D-5500-P-01330.
6. AREA OF WORK FOR SWRB TIE-IN TO EXISTING REINJECTION PIPING.  
FOR DETAIL SEE DRAWING 51D-5500-P-01330.



			O	ISSUED FOR CAWWT "STAGE I" CONSTRUCTION	MOM	JMG			
			B	90% REVIEW	W/SO	JSW			
			A	60% REVIEW	W/O	JSW			
NO.	REVISIONS	DATE DWN. BY APPD.	NO.	REVISIONS	DATE DWN. BY APPD.	REF.	DWG.	NO.	

NOTE:  
FLUOR FERNALD  
CADD DRAWING,  
DO NOT REVISE  
MANUALLY.

CONFIGURATION  
MANAGEMENT  
DRAWING

SYSTEMS, STRUCTURES, OR COMPONENTS  
IDENTIFIED ON THIS DRAWING ARE TO BE  
CONFIGURATION MANAGEMENT CONTROLLED  
SEE NOTES

COGNIZANT ENGINEER . DAT

APPROVALS			
CIVIL & STR.		SAFETY ENG.	
ELECTRICAL		MAINTENANCE	
ENGINEER		FIRE PROTECT.	
INSTRUMENT		WASTE MNGT.	
MECHANICAL		SECURITY	
		PROJECTS	
CHECKED	156 For		

**FLUOR FERNALD, INC.**

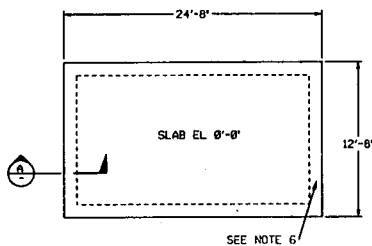
U.S. DEPARTMENT OF ENERGY

PROJECT 59600		STAGE 1	
BLDG. 51D		ADVANCED WASTEWATER TREATMENT (AWWT)	
CONVERTED AWWT (CAWWT)		SITE PLAN	
SCALE: 1" = 40'-0"			
RES. 45B			
DATE 4/30/04	51D-5500-G-01325 0		

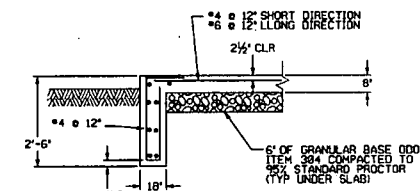


5632

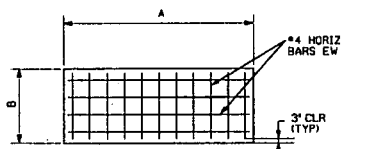
- NOTES:
1. EXPANSION ANCHOR BOLTS SHALL BE ITW RAMSET/REDHEAD TRUBOLT WEDGE ANCHOR OR EQUAL AND BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
  2. ALL DIMENSIONS AND ANCHOR BOLT SIZES SHALL BE VERIFIED FROM CERTIFIED VENDOR DRAWINGS OR FIELD VERIFIED FROM RELOCATED EQUIPMENT BEFORE INSTALLATION OF FOUNDATION.
  3. FOUNDATION PAD THICKNESS TO BE FIELD DETERMINED TO ALIGN PIPING WITH EQUIPMENT PER DESIGN. PUMP PADS SHALL BE A MINIMUM OF 12".
  4. GROUT AS NEEDED (NOT TO EXCEED 3").
  5. COORDINATE LOCATION OF REBAR IN THE SUB-STATION FOUND. PAD WITH ELECTRICAL A CHANNEL MUST BE CREATED IN THE PAD FOR THE CONDUIT FEEDER LINE.
  6. OPTIONAL TURNDOWN SLAB CONSTRUCTION: EXCAVATE 2'-6" DEEP, FILL TO 6" SLAB DEPTH W/FILCRETE, CAST CONDUIT IN FILCRETE. PROVIDE SLAB REINFORCING AS SHOWN.



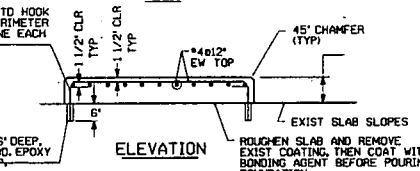
TRANSFER PAD - DETAIL 3



SECTION A-A

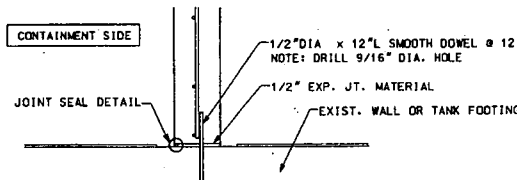
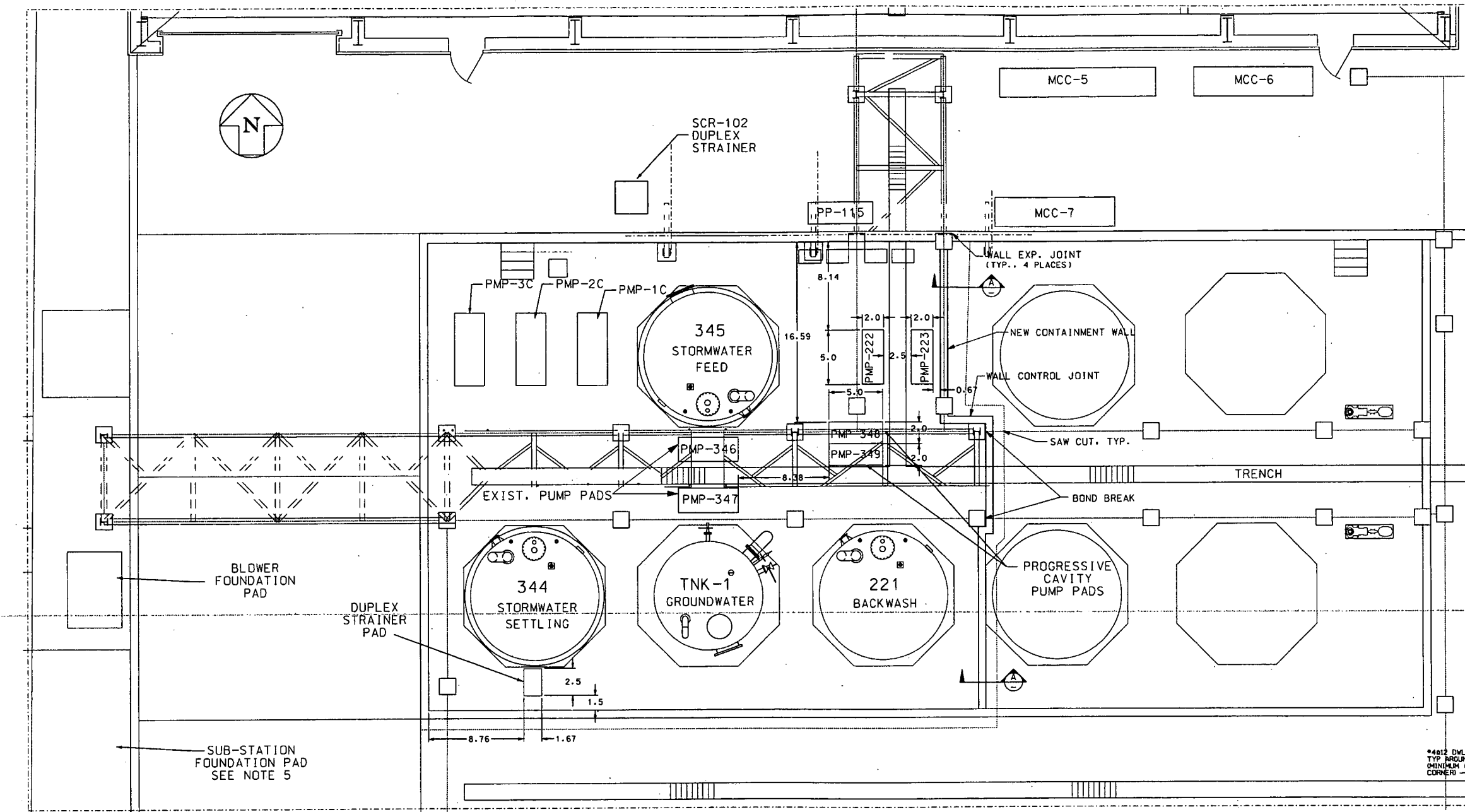


PLAN

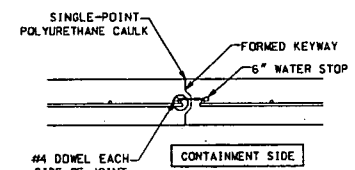


ELEVATION

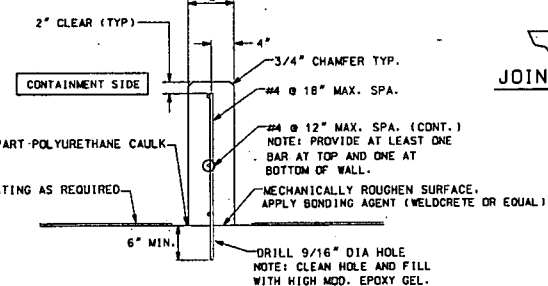
EQUIP PAD FND. - DETAIL 2



WALL EXP. JOINT DETAIL PLAN VIEW

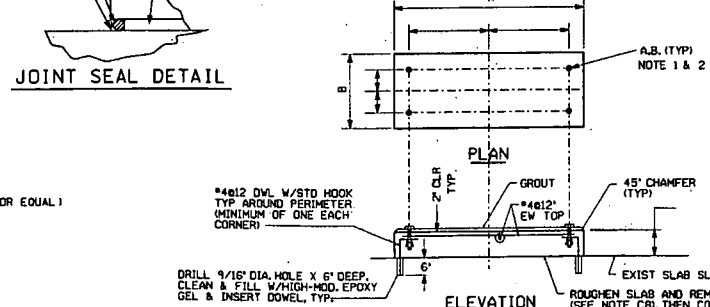


WALL CONTROL JOINT DETAIL PLAN VIEW



CONTAINMENT WALL DETAIL A-A

NOTE: TOP OF NEW CONTAINMENT WALL TO MATCH EXIST. CONTAINMENT WALL



EQUIP PAD FND. - DETAIL 1

EQUIPMENT FOUNDATION SCHEDULE									
LETTER	PUMPS 222 & 228	PUMPS 345 & 347	PUMPS 348 & 349	RELOCATED 10" STRAINER	NEW 8" STRAINER	NEW SUB-STATION (NOTE 5)	MOTOR CONTROL CENTER (MCC-7)	POWER PANEL (PP115)	REMARKS
A	-	EX. 11-18"	8'-0"	2'-0"	3'-0"	18'-0"	8'-0"	8'-0"	
B	-	EX. 2'-0"	2'-0"	4'-0"	3'-0" 3/4"	24'-0"	3'-0"	2'-0"	
E	-	EX. 5'-0" 3/4"	1'-10 1/2"	8'-0"	8'-0" 1/2"	-	-	-	
F	-	EX. 18 1/2"	8'-0"	1'-3 3/8"	8'-0"	-	-	-	
EXP. ANCH.	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	5/8" DIA. HIGH MOD. EPOXY GEL. 6" DEEP	SEE NOTES 1 & 2
MIN. DEPTH	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	PROVIDE PROTECTION
THICKNESS	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	NOTE 3	
GROUT	DET 1	DET 1	DET 1	DET 1	DET 1	DET 1	DET 1	DET 1	GROUT THICKNESS MINIMUM - 1"
FINISH	DET 1	DET 1	DET 1	DET 1	DET 1	DET 1	DET 1	DET 1	

NO.	REVISIONS	DATE	BY	APPD.	NO.	REVISIONS	DATE	BY	APPD.	REF. DWG. NO.

NOTE: FLUOR FERNALD CADD DRAWING, DO NOT REVISE MANUALLY.

CONFIGURATION DRAWING

DATE: 10/15/03

COORDINATOR: [Signature]

DATE: 10/15/03

CHECKED: [Signature]

APPROVED: [Signature]

SAFETY ENG. [Signature]

ELECTRICAL ENGINEER [Signature]

INSTRUMENT MECHANICAL [Signature]

WASTE MANAGE [Signature]

SECURITY PROJECTS [Signature]

PROJECT 59600 STAGE I

BLDG. 51A

AWWT

AWWT CONVERSION

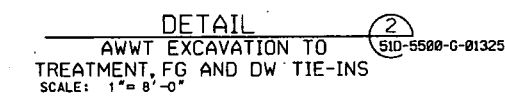
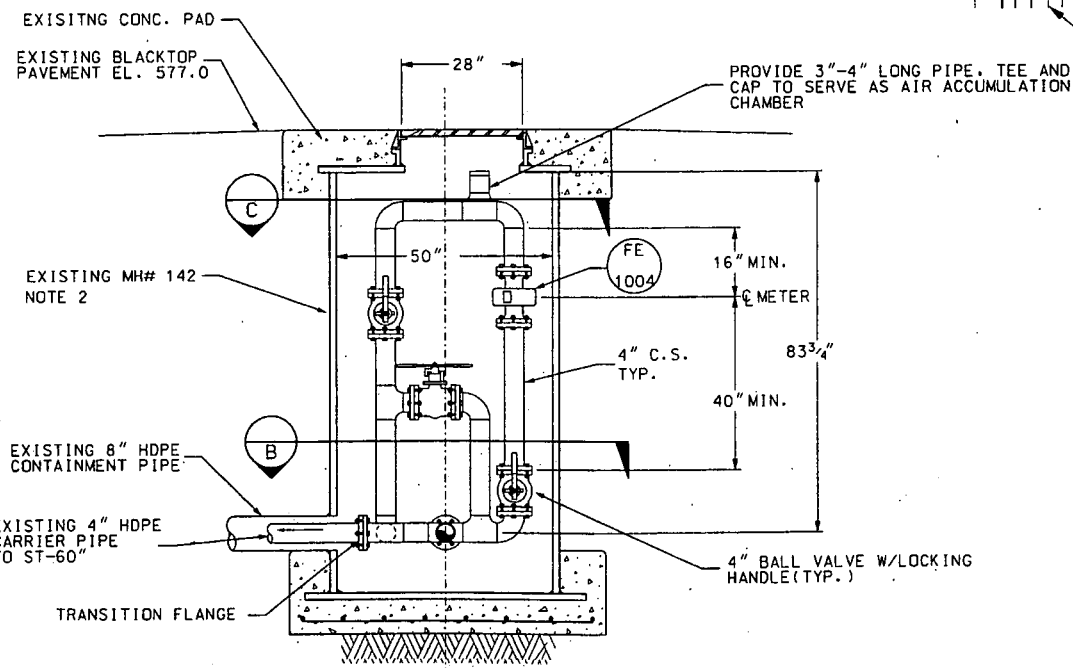
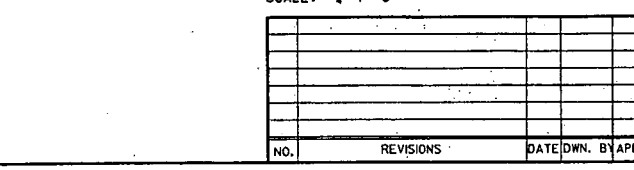
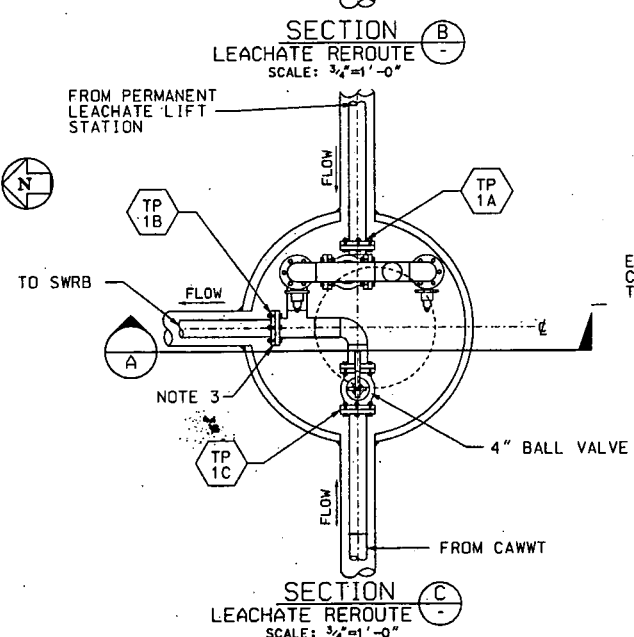
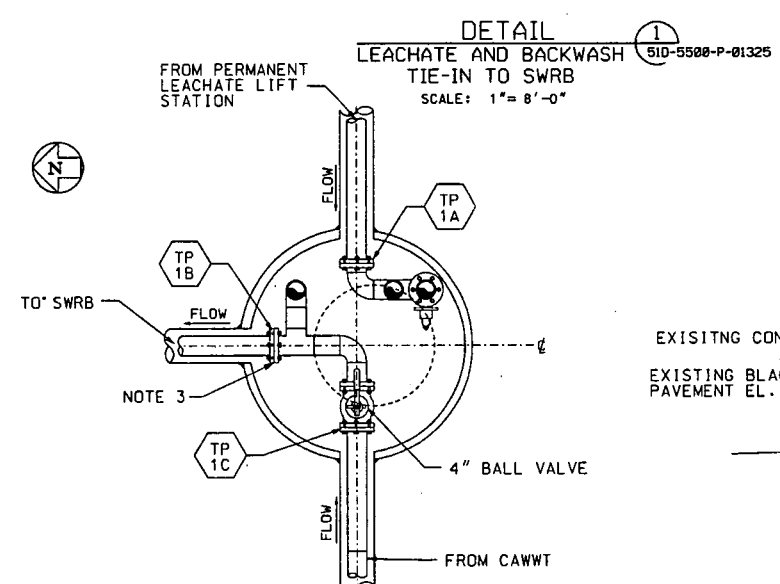
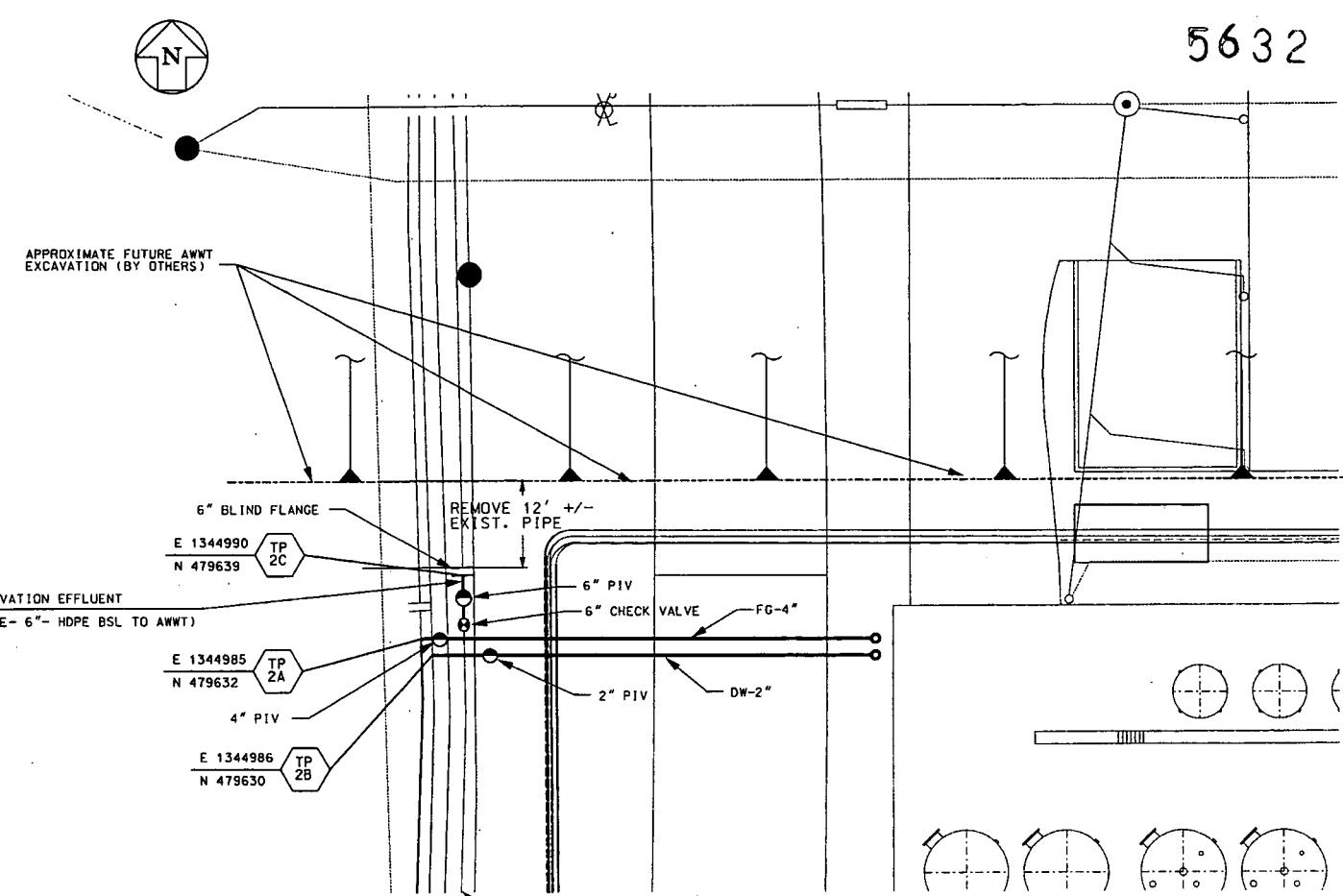
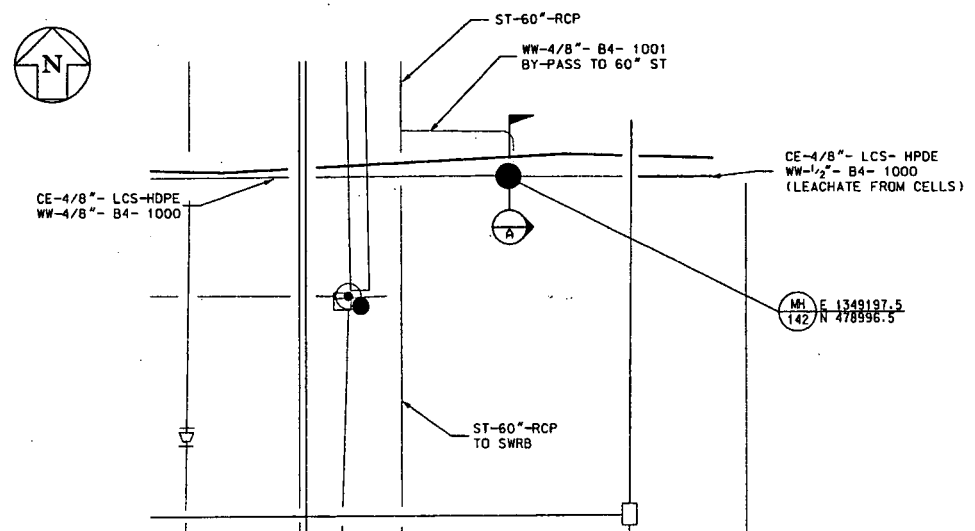
CONTAINMENT WALL & PUMP PADS

SCALE 1/8"=1'-0"

51D-5500-S-01352

0

FILE NAME: r064518/51d1352.dgn



- NOTE:**
1. PIPELINE(S) SHOWN ON THIS DRAWING ARE DEVELOPED BY CONNECTING SEVERAL EXISTING PIPELINES. WHERE APPLICABLE THE NEW PIPELINE IDENTIFICATION AND SERVICE DESCRIPTION IS NOTED ON TOP OF PIPELINE IDENTIFICATION ARROW AND THE EXISTING ON THE BOTTOM.  
NEW PIPE ID.  
(EXIST. PIPE ID.)
  2. REMOVE EXISTING PIPE AND VALVES INSIDE MANHOLE
  3. INSTALL LINE BLIND UNTIL BSL GOES OUT OF SERVICE.

NO.	REVISIONS	DATE/DWN. BY/APPD. NO.	REVISIONS	DATE/DWN. BY/APPD. NO.	REF. DWG. NO.

NOTE:  
FLUOR FERNALD  
CADD DRAWING,  
DO NOT REVISE  
MANUALLY.

CONFIGURATION  
MANAGEMENT  
DRAWING

APPROVALS

CIVIL & STR.	SAFETY ENG.
ELECTRICAL	MAINTENANCE
ENGINEER	FIRE PROTECT.
INSTRUMENT	WASTE MANAGE.
MECHANICAL	SECURITY
	PROJECTS

**Fernald Closure Project**  
**FLUOR FERNALD, INC.**  
**U.S. DEPARTMENT OF ENERGY**

PROJECT 59600 STAGE I  
BLOG. 51A  
ADVANCED WASTEWATER TREATMENT(AWWT)  
CONVERTED AWWT (CAWWT)  
PIPING DETAILS  
SHEET 1 OF 3

ISSUED FOR CAWWT 'STAGE I' CONSTRUCTION  
B 90% REVIEW  
A 60% REVIEW

DATE/DWN. BY/APPD. NO.

DATE/DWN. BY/APPD. NO.

DATE/DWN. BY/APPD. NO.

DATE/DWN. BY/APPD. NO.

## SINGLE LINE DIAGRAM SYMBOLS

ARRÊSTER		YY-XXXX 'YY' INDICATES SPECIAL IDENTIFIER 'XXXX' INDICATES ID NO.
CIRCUIT BREAKER, LOW VOLTAGE		FFFF 'FFFF' INDICATES FRAME RATING AMPS 'TTTT' INDICATES TRIP RATING AMPS
CIRCUIT BREAKER, MEDIUM VOLTAGE		FFFF 'FFFF' INDICATES FRAME RATING AMPS 'TTTT' INDICATES TRIP RATING AMPS
COMBINATION STARTER, NON-REVERSING		TTTT 'TTTT' INDICATES TRIP RATING AMPS 'ZZZZ' INDICATES NEMA SIZE EQUIPMENT OUTLINE (TYP)
CURRENT TRANSFORMER		YY 'YY' INDICATES NO. OF CT(S) 'ZZZZ' INDICATES CT RATIO(S)
DISCONNECT SWITCH		FFFF 'FFFF' INDICATES FRAME RATING AMPS
DRAW-OUT DEVICE/RECEPTACLE		FFFF 'FFFF' INDICATES FRAME RATING AMPS 'TTTT' INDICATES TRIP RATING AMPS
FUSE		XXXX 'XXXX' INDICATES ID NO. 'YY' INDICATES SPECIAL IDENTIFIER 'TTTT' INDICATES TRIP RATING AMPS
GENERATOR		XXXX 'XXXX' INDICATES ID NO. 'YYY' INDICATES SPECIAL INDICATOR
INDICATING METER		ZZZ 'ZZZ' INDICATES EQUIPMENT SIZE IN KVA OR KW
LOAD, NON-MOTOR		ZZZ 'ZZZ' INDICATES HORSEPOWER SIZE
MOTOR		ZZZ 'ZZ' INDICATES NEMA SIZE
MOTOR OVERLOAD RELAY		ZZ 'ZZ' INDICATES NEMA SIZE
MOTOR STARTER CONTACT		ZZ 'ZZ' INDICATES NEMA SIZE
PANEL MOUNTED SWITCH		XXXX 'YY' INDICATES SPECIAL IDENTIFIER 'XXXX' INDICATES ID NO.
POTENTIAL TRANSFORMER		ZZZZ 'ZZZZ' INDICATES VOLTAGE RATIO (TYP. 14.4K/120)
SYMBOL 3 PHASE DELTA		
SYMBOL 3 PHASE WYE GROUNDED		
TRANSFER SWITCH		YY-XXXX 'YY' INDICATES SPECIAL IDENTIFIER 'XXXX' INDICATES ID NO.
WELDING/POWER RECEPTACLE		
TRANSFORMER		XXXX 'XXXX' INDICATES ID NO. 'ZZZZ' INDICATES TRANSFORMER RATINGS - KVA, 1 OR 3 PHASE, VOLTAGE RATIO, IMPEDANCE

## ELEMENTARY DIAGRAM SYMBOLS

CIRCUIT BREAKER		TTTT 'TTTT' INDICATES TRIP RATING AMPS
CONTACT		YY-XXXX 'YY' INDICATES SPECIAL IDENTIFIER 'XXXX' INDICATES ID NO.
CONTACT		YY-XXXX 'YY' INDICATES SPECIAL IDENTIFIER 'XXXX' INDICATES ID NO.
CONTROL POWER XFMR		H1 480V H2 X1 120V X2 CPT
DISCONNECT SWITCH		FFFF 'FFFF' INDICATES FRAME RATING AMPS
DISCONNECT SWITCH, 3 PHASE		DSWXXXX 'XXXX' INDICATES ID NO. 'FFFF' INDICATES FRAME RATING AMPS
EQUIPMENT LOAD, 1 PHASE		H1 H2 ZZZZ 'ZZZZ' INDICATES EQUIPMENT SIZE IN 'KVA' OR 'KW'
EQUIPMENT LOAD, 1 PHASE		H1 H2 ZZZZ 'ZZZZ' INDICATES EQUIPMENT SIZE IN 'KVA' OR 'KW'
EQUIPMENT LOAD, 3 PHASE		H1 H2 H3 ZZZZ 'ZZZZ' INDICATES EQUIPMENT SIZE IN 'KVA' OR 'KW'
FUSE		XXXX 'XXXX' INDICATES ID NO. 'TTTT' INDICATES TRIP RATING AMPS 'Y' INDICATES SPECIAL IDENTIFIER
GROUND		
MOTOR, 1 PHASE		T1 T2 ZZZ 'ZZZ' INDICATES HP SIZE
MOTOR, 1 PHASE		T1 T2 ZZZ 'ZZZ' INDICATES HP SIZE
MOTOR, 3 PHASE		T1 T2 T3 ZZZ 'ZZZ' INDICATES HP SIZE
OVERLOAD ELEMENT		DL
PILOT LIGHT		XXXX 'XXXX' INDICATES ID NO. 'YY' INDICATES SPECIAL IDENTIFIER
PUSH-TO-TEST LIGHT		XXXX 'XXXX' INDICATES ID NO. 'YY' INDICATES SPECIAL IDENTIFIER
RELAY		XXXX 'XXXX' INDICATES ID NO. 'YY' INDICATES SPECIAL IDENTIFIER
RELAY, TIME DELAY		TDR-XXXX TIME DELAY AFTER ENERGIZED, 'XXXX' INDICATES ID NO. 'TTTT' INDICATES TIMING SET POINT
RELAY, TIME DELAY		TDR-XXXX TIME DELAY AFTER DE-ENERGIZED, 'XXXX' INDICATES ID NO. 'TTTT' INDICATES TIMING SET POINT
RESISTOR		XXXX 'XXXX' INDICATES ID NO. 'ZZZZ' INDICATES SIZE IN OHMS

WIRING BY SUB-CONTRACTOR  
WIRING BY VENDOR

## SWITCHES

FLOW SWITCH		NORMALLY CLOSED, OPENS ABOVE SET FLOW
FLOW SWITCH		NORMALLY OPEN, CLOSSES ABOVE SET FLOW
FOOT SWITCH		NORMALLY OPEN, CLOSSES WHEN ACTUATED
FOOT SWITCH		NORMALLY CLOSED, OPENS WHEN ACTUATED
LEVEL SWITCH		NORMALLY CLOSED, OPENS ABOVE SET LEVEL
LEVEL SWITCH		NORMALLY OPEN, CLOSSES ABOVE SET LEVEL
LIMIT SWITCH		NORMALLY OPEN, SHOWN CLOSED BY MECHANICAL OPERATION
LIMIT SWITCH		NORMALLY CLOSED, SHOWN OPEN BY MECHANICAL OPERATION
LIMIT SWITCH		NORMALLY OPEN, CLOSSES BY MECHANICAL OPERATION
LIMIT SWITCH		NORMALLY CLOSED, OPENS BY MECHANICAL OPERATION
VACUUM SWITCH		NORMALLY OPEN, CLOSSES BELOW SET PRESSURE
VACUUM SWITCH		NORMALLY CLOSED, OPENS BELOW SET PRESSURE
PRESSURE SWITCH		NORMALLY CLOSED, OPENS ABOVE SET PRESSURE
PRESSURE SWITCH		NORMALLY OPEN, CLOSSES ABOVE SET PRESSURE
PUSHBUTTON		MOMENTARY OR MAINTAIN CONTACT (XX = MC, NORMALLY OPEN CONTACT)
PUSHBUTTON		MOMENTARY OR MAINTAIN CONTACT (XX = MC, NORMALLY CLOSED CONTACT)
PUSHBUTTON, MUSHROOM HEAD		MOMENTARY OR MAINTAIN CONTACT (XX = MC, NORMALLY OPEN CONTACT)
PUSHBUTTON, MUSHROOM HEAD		MOMENTARY OR MAINTAIN CONTACT (XX = MC, NORMALLY CLOSED CONTACT)
SELECTOR SWITCH (GENERAL)		XXXX 'XXXX' INDICATES ID NO. 'YY' INDICATES NAME OF CURRENT SWITCH POSITION, 'ZZ' INDICATES NAME OF OTHER SWITCH POSITION(S) 'X' INDICATES CLOSED CIRCUIT POSITION 'O' INDICATES OPEN CIRCUIT POSITION (CONTACTS DIAGRAMMATICALLY SHOWN CLOSED)
TEMPERATURE SWITCH		NORMALLY CLOSED, OPENS ABOVE SET TEMPERATURE
TEMPERATURE SWITCH		NORMALLY OPEN, CLOSSES ABOVE SET TEMPERATURE
TIMER SWITCH		NORMALLY CLOSED, OPENS ON TIME DELAY AFTER COIL IS ENERGIZED
TIMER SWITCH		NORMALLY OPEN, CLOSSES ON TIME DELAY AFTER COIL IS ENERGIZED
TIMER SWITCH		NORMALLY CLOSED, CLOSSES ON TIME DELAY AFTER COIL IS DE-ENERGIZED
TIMER SWITCH		NORMALLY OPEN, OPENS ON TIME DELAY AFTER COIL IS DE-ENERGIZED
TORQUE SWITCH		NORMALLY OPEN, CLOSSES BELOW SET POINT
TORQUE SWITCH		NORMALLY CLOSED, OPENS ABOVE SET POINT
SOLENOID VALVE COIL		XXXX 'XXXX' INDICATES ID NO.
THERMAL OVERLOAD CONTACT		DL NORMALLY CLOSED, OPENS WHEN OVERLOAD RELAY(S) TRIP

- SEE DRAWING 95X-5900-E-00302 FOR SINGLE LINE DIAGRAM.
- THE SYMBOLS SHOWN ARE TYPICAL GENERIC SYMBOLS USED TO REPRESENT EQUIPMENT IN THE ELECTRICAL DRAWINGS. SYMBOLS RELATING TO SPECIFIC ITEMS WILL BE DEFINED ON THE ASSOCIATED DRAWING.

## SPECIAL IDENTIFIERS

A	AMBER LIGHT OR AMMETER
AS	AMMETER SWITCH
ATS	AUTOMATIC TRANSFER SWITCH
C	CLEAR LIGHT
CB	CIRCUIT BREAKER
CL	CURRENT LIMITING FUSE
CR	CONTROL RELAY
CS	CONTROL SWITCH
E	HIGH SPEED, MEDIUM VOLTAGE FUSE
G	GREEN LIGHT
LA	LIGHTNING ARRESTER
LR	LATCHING RELAY
M	MOTOR RELAY
MTS	MANUAL TRANSFER SWITCH
PF	POWER FACTOR METER
R	RED LIGHT
SA	SURGE ARRESTER
SP	SPARE
T	TIME DELAY FUSE
V	VOLTMETER
VS	VOLTMETER SWITCH
W	WATTMETER
WH	WATTHOUR METER
WHO	WATTHOUR DEMAND METER

5632

PROJECT NO. 59600

Fernald Closure Project

FLUOR FERNALD, INC.

U.S. DEPARTMENT OF ENERGY

BLOG. 51A  
ADVANCED WASTEWATER TREATMENT (AWWT)  
CONVERTED AWWT (CAWWT)  
ELECTRICAL SYMBOLS & LEGEND  
SHEET 1 OF 2

RES 450  
DATE 6/10/04  
DRAWN C.E. PAUL  
51D-5500-E-01339 0

FILE NAME: /RES4518/CAWWT/51D1339.DGN

NOTE:

FLUOR FERNALD  
CADD DRAWING  
DO NOT REVISE  
MANUALLY.

CONFIGURATION

DATE 6/10/04  
DRAWN C.E. PAUL  
51D-5500-E-01339 0

COORDINATOR ENGINEER  
DATE 6/10/04  
DRAWN C.E. PAUL  
51D-5500-E-01339 0

APPROVALS

CIVIL & STR.  
ELECTRICAL  
ENGINEER  
INSTRUMENT  
MECHANICAL

CHECKED  
APPROVED

SAFETY ENG.

MAINTENANCE  
ELECTRICAL  
ENGINEER  
WASTE MANAGE  
SECURITY  
PROJECTS

CHECKED  
APPROVED

NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REVISIONS	DATE	OWN.	BY	APPD.	REF.	DWG. NO.

ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION

MOM GEP

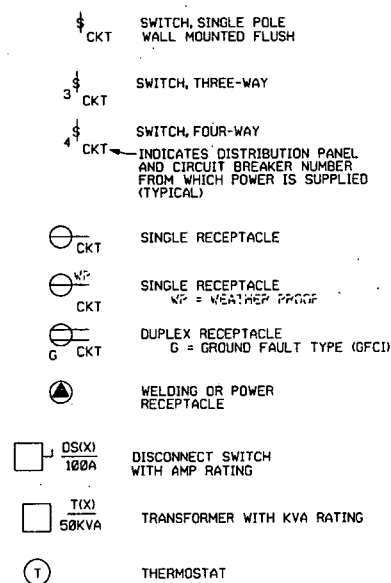


# ELECTRICAL PLAN SYMBOLS

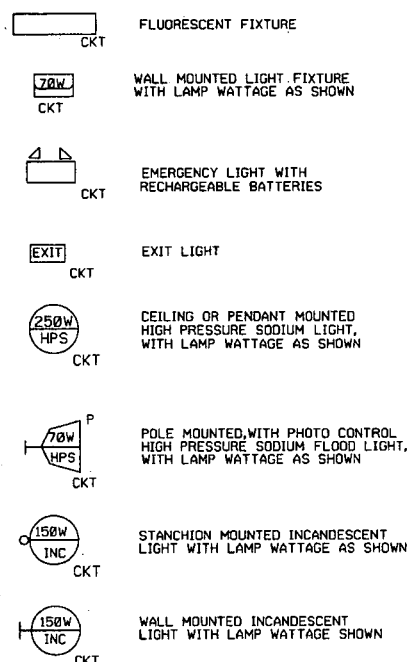
5632

- SEE DRAWING 95X-5900-E-00300 FOR SYMBOLS AND LEGENDS.
- SEE DRAWING 95X-5900-E-00302 FOR SINGLE LINE DIAGRAM.
- THE SYMBOLS SHOWN ARE TYPICAL GENERIC SYMBOLS USED TO REPRESENT EQUIPMENT IN THE ELECTRICAL DRAWINGS. SYMBOLS RELATING TO SPECIFIC ITEMS WILL BE DEFINED ON THE ASSOCIATED DRAWING.

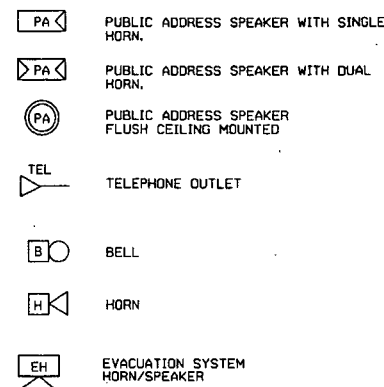
## SWITCH AND RECEPTACLE SYMBOLS



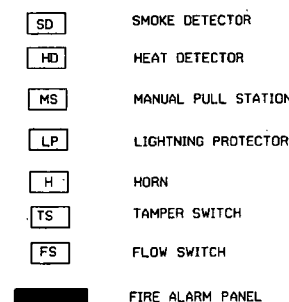
## LIGHTING SYMBOLS



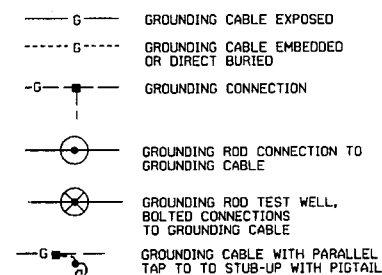
## COMMUNICATIONS SYMBOLS



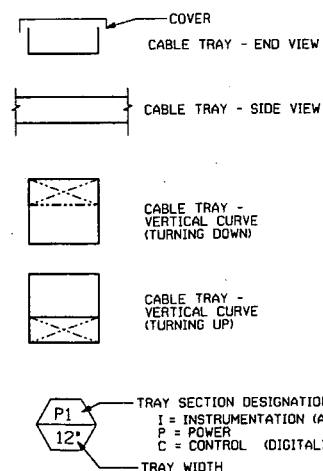
## FIRE ALARM SYMBOLS



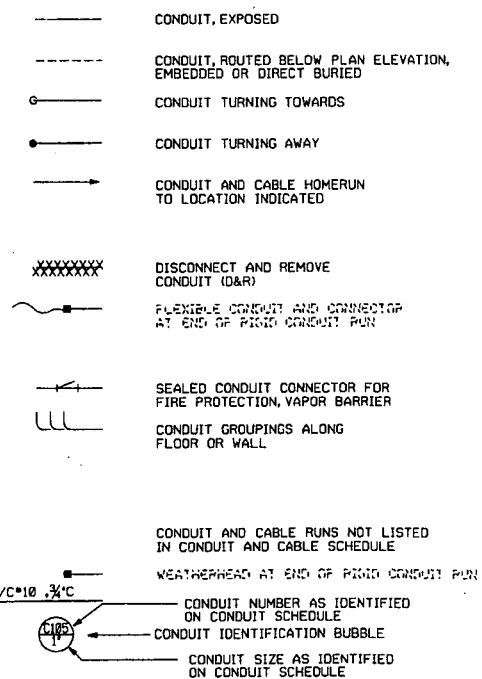
## GROUNDING SYMBOLS



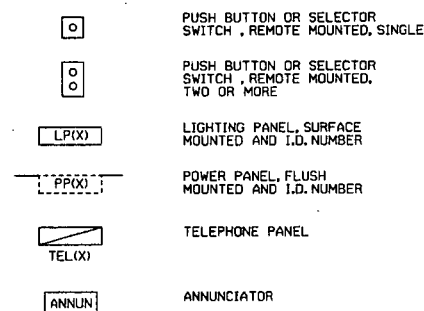
## CABLE TRAY SYMBOLS



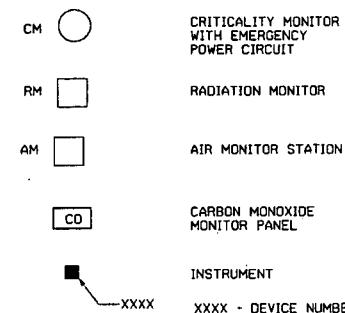
## CONDUIT, LINE AND DUCTBANK SYMBOLS



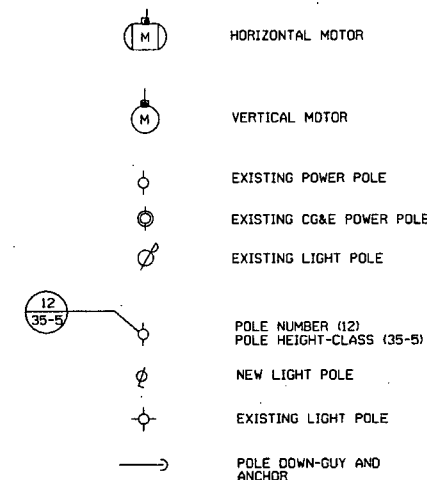
## PUSHBUTTON AND PANEL SYMBOLS



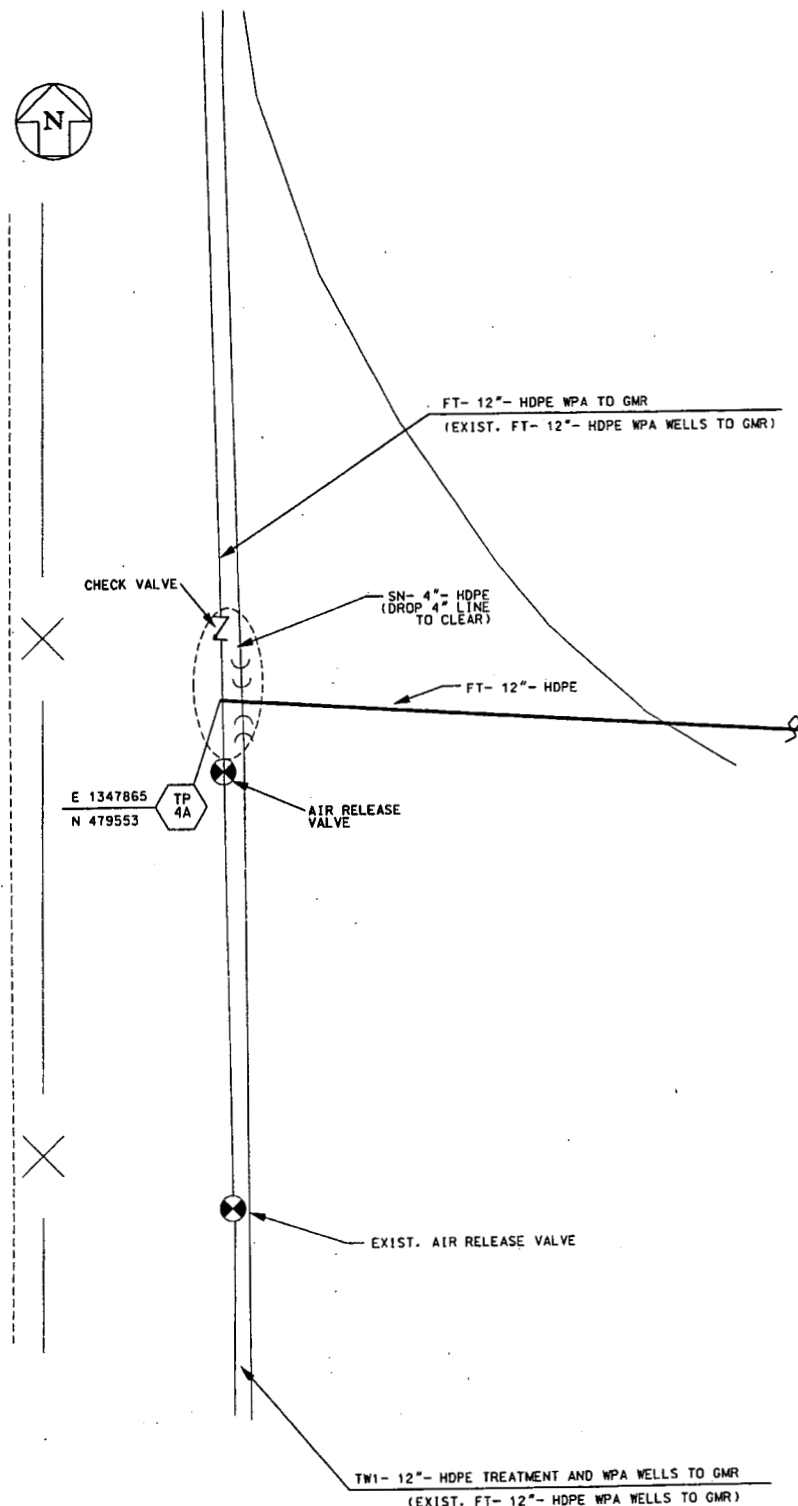
## MONITOR SYMBOLS



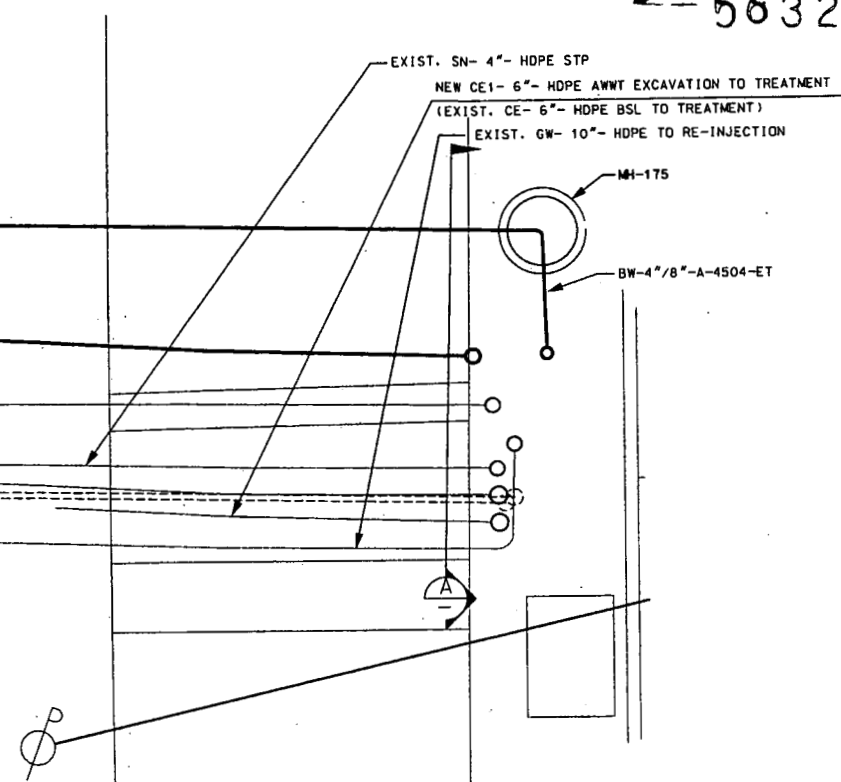
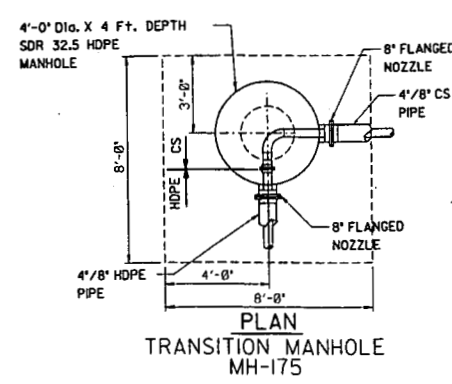
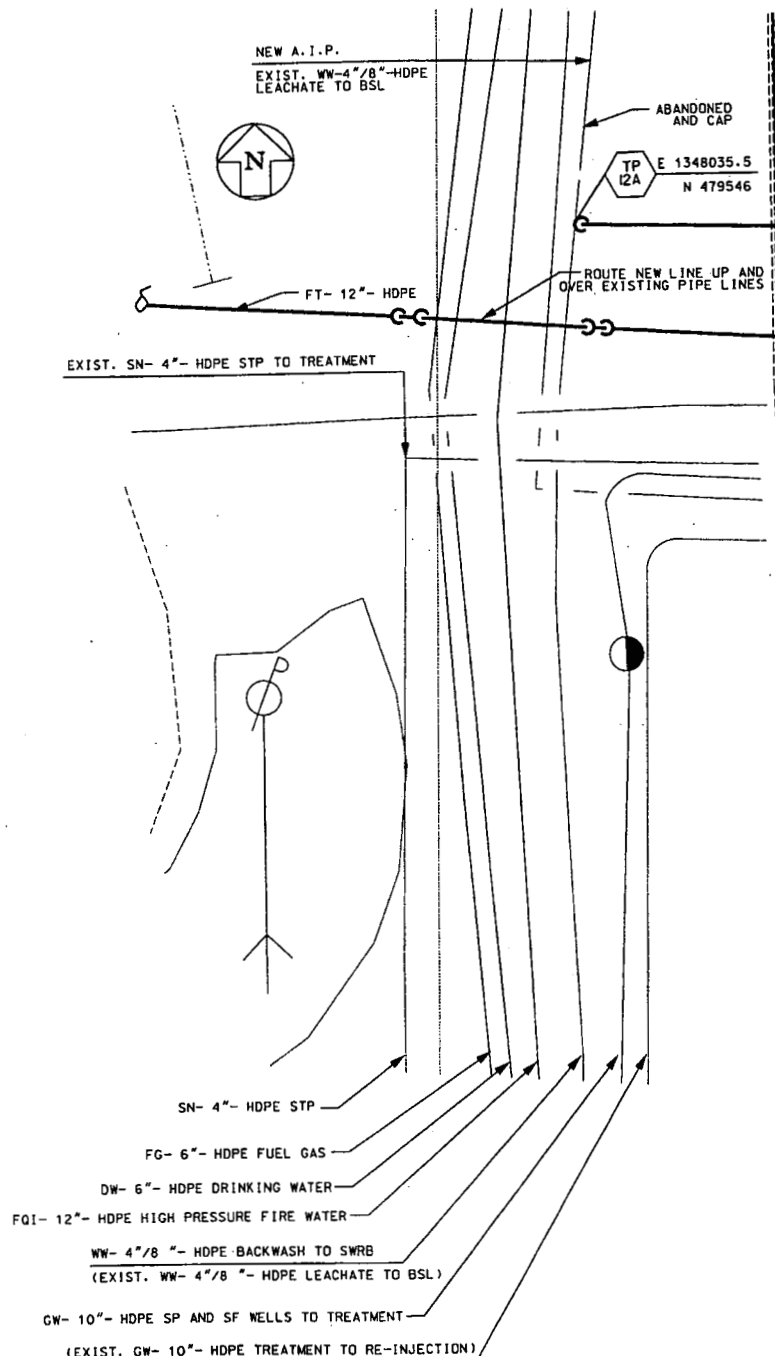
## MISCELLANEOUS SYMBOLS



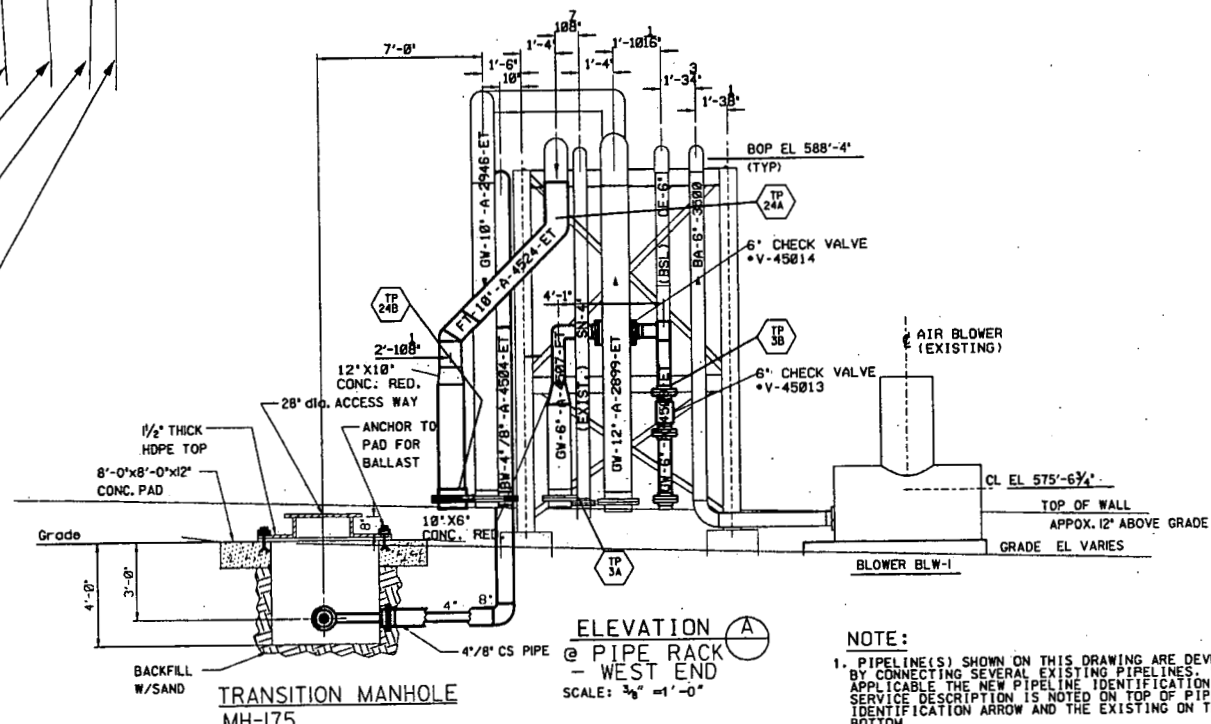
PROJECT NO. 59600 BLDG. 51A ADVANCED WASTEWATER TREATMENT (CAWWT) CONVERTED AWWT (CAWWT) ELECTRICAL SYMBOLS & LEGEND SHEET 2 OF 2				Fernald Closure Project <b>FLUOR FERNALD, INC.</b> U.S. DEPARTMENT OF ENERGY			
NO. REVISIONS DATE/DWN. BY APPD. NO. REVISIONS DATE/DWN. BY APPD. REF. DWG. NO.				NOTE: FLUOR FERNALD CADD DRAWING, DO NOT REVISE MANUALLY.			
0 ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION 10/01 GEP				CONFIGURATION MANAGEMENT DRAWING DATE 6/10/04 CHECKED JSD/PC APPROVED G. Paul			
APPROVALS CIVIL & STR. ENGINEER ELECTRICAL ENGINEER INSTRUMENT MECHANICAL SAFETY ENG. MAINTENANCE FIRE PROTECT. WASTE MANAGE. SECURITY PROJECTS				RES. #4518 DATE 6/10/04 DRAWN C.E. PAUL 51D-5500-E-01340.0			



**DETAIL**  
NEW 10"- HDPE TREATMENT  
TIE-IN TO EXISTING WPA WELLS  
SCALE: 1"= 4'-0"



**DETAIL**  
NEW A.I.P. - EXIST WW 4"/8"  
HDPE, LEACHATE TO BSL  
SCALE: 1"= 4'-0"



**NOTE:**  
1. PIPELINE(S) SHOWN ON THIS DRAWING ARE DEVELOPED BY CONNECTING SEVERAL EXISTING PIPELINES. WHERE APPLICABLE THE NEW PIPELINE IDENTIFICATION AND SERVICE DESCRIPTION IS NOTED ON TOP OF PIPELINE IDENTIFICATION ARROW AND THE EXISTING ON THE BOTTOM.  
NEW PIPE ID.  
(EXIST. PIPE ID.)  
2. COORDINATE PIPE ROUTING AND NEW PIPE SUPPORT FOUNDATION LOCATION IN FIELD.

NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REF. DWG. NO.

NOTE: FLUOR FERNALD CADD DRAWING, DO NOT REVISE MANUALLY.	CONFIGURATION MANAGEMENT DRAWING	APPROVALS
		CIVIL & STR.
		ELECTRICAL
		ENGINEER
		INSTRUMENT
		MECHANICAL
		SAFETY ENG.
		MAINTENANCE
		PRR. PROTECT.
		WASTE MANAGE.
		SECURITY
		PROJECTS
		CHECKED
		APPROVED

Fernald Closure Project	CAWWT
FLUOR FERNALD, INC.	CONVERTED AWWT (CAWWT)
U.S. DEPARTMENT OF ENERGY	PIPE DETAILS
	SHEET 2 OF 3
DATE 9-12-04	51D-5500-P-01329
DRAWN J. GOLDBERRY	0



NOTE:

- |               |         |
|---------------|---------|
| PROJECT 59600 | STAGE 1 |
|---------------|---------|

NOTE:  
FLUOR FERNAL  
CADD DRAWING  
DO NOT REVISE  
MANUALLY.

**CONFIGURATION  
MANAGEMENT  
DRAWING**

SYSTEMS, STRUCTURES, OR COMPONENTS  
IDENTIFIED IN THIS DRAWING ARE UNDER  
CONFIGURATION MANAGEMENT CONTROL.  
SEE NOTES.

REV	DATE	DESCRIPTION
1	10/1/80	INITIAL RELEASE

Fernald Closure Project

**FLUOR FERNALD, INC.**

U.S. DEPARTMENT OF ENERGY


CAWWT	
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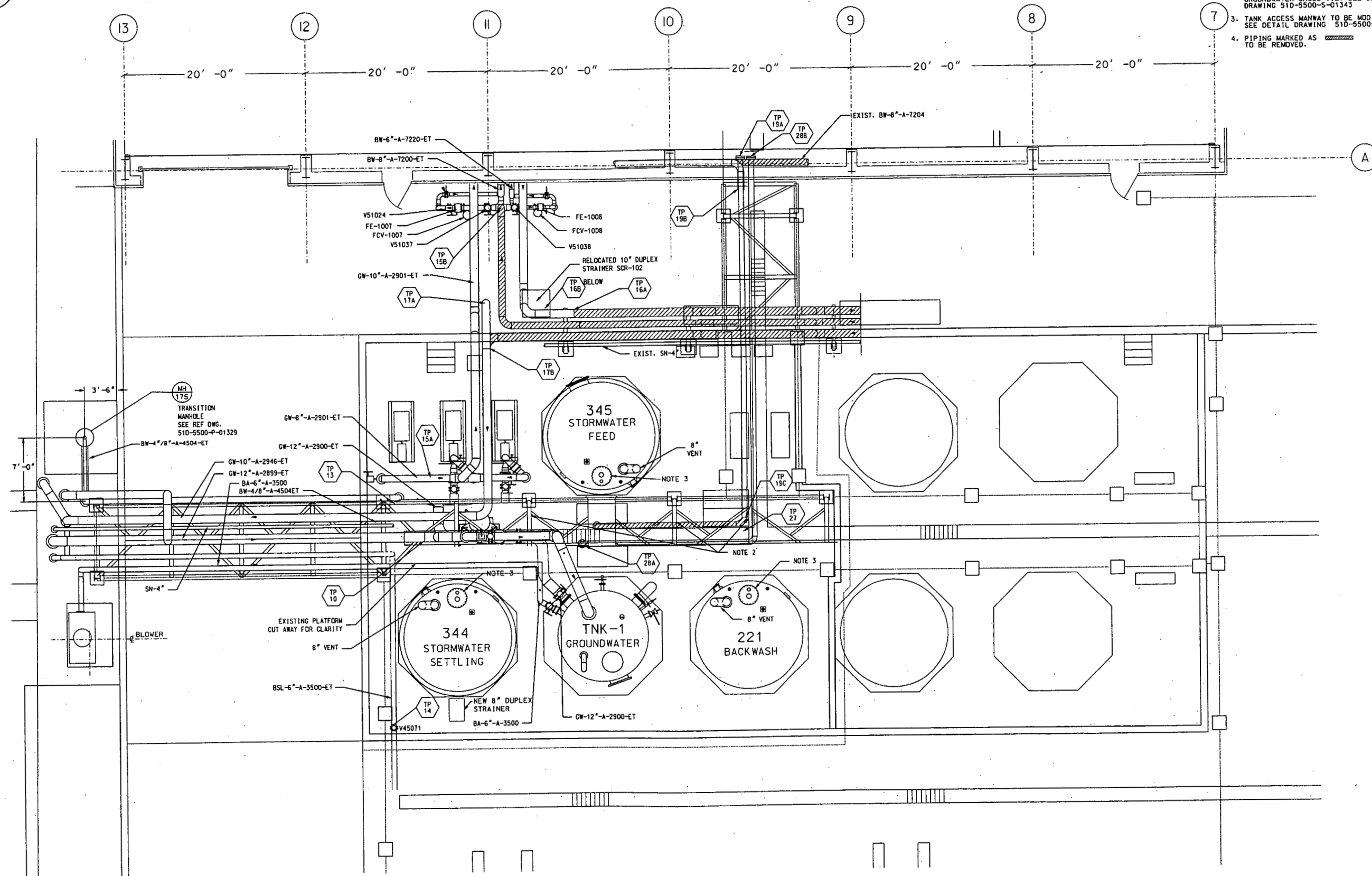
CONVERTED AWWT (CAWWT)  
PIPING DETAILS  
SHEET 3 OF 3

RES 4540	51D-5500-P-01330	0
DATE 6-12-04		
DRAWN J. GOLDSBERRY		

FILE NAME: res4518/5ldpl330.dgn

NOTES:

1. REFER TO PIPING ISOMETRIC DRAWINGS  
IN SPECS. FOR DETAIL AT TIE-IN POINTS.
2. PROVIDE MISC. STEEL SUPPORTS FOR TP-10  
GROUNDWATER CROSS TIE. SEE DETAIL  
DRAWING 510-5500-S-01343
3. TANK ACCESS WAYWAY TO BE MODIFIED.  
SEE DETAIL DRAWING 510-5500-S-01343
4. PIPING MARKED AS  TO  
BE REMOVED.

[illegible]

NOTE:  
FLUOR FERNALD  
CADD DRAWING,  
DO NOT REVISE  
MANUALLY.

**CONFIGURATION  
MANAGEMENT  
DRAWING**

SYSTEMS, STRUCTURES OR COMPONENTS  
IDENTIFIED ON THIS DRAWING ARE LOGGED  
ON CONFIGURATION MANAGEMENT CONTROL  
SIX NOTES.

COGNIZANT ENGINEER DATE

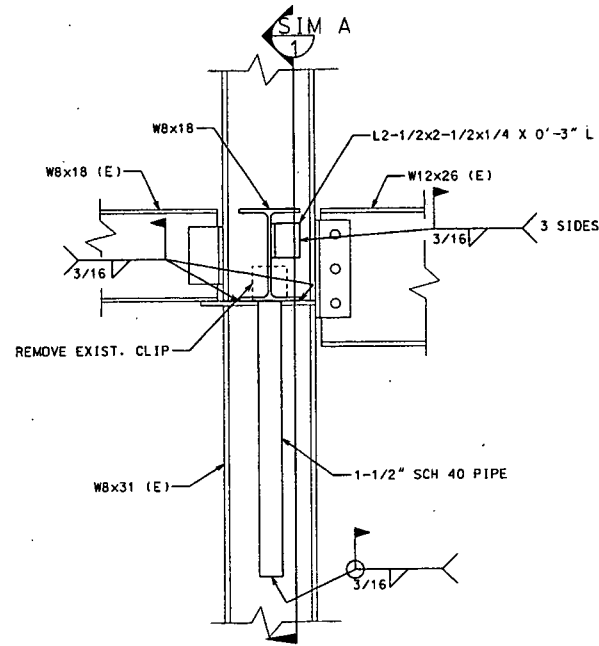
APPROVALS			
CIVIL & STR.		SAFETY ENG.	
ELECTRICAL		MAINTENANCE	
ENGINEER		PRG. PROTECT.	
INSTRUMENT		WASTE MANAGE	
MECHANICAL		SECURITY	
		PROJECTS	
CHECKED	180 for		

Fernald Closure Project

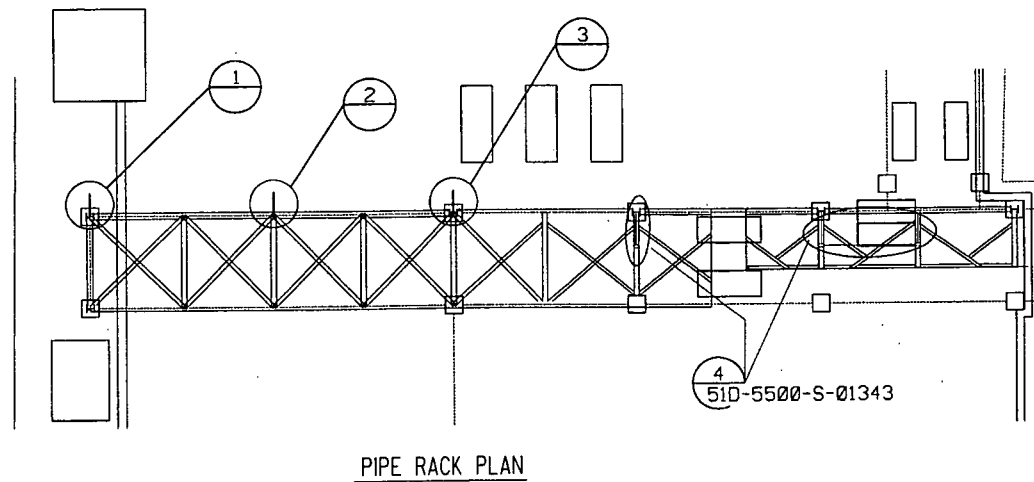
**FLUOR FERNALD, INC.**

U.S. DEPARTMENT OF ENERGY

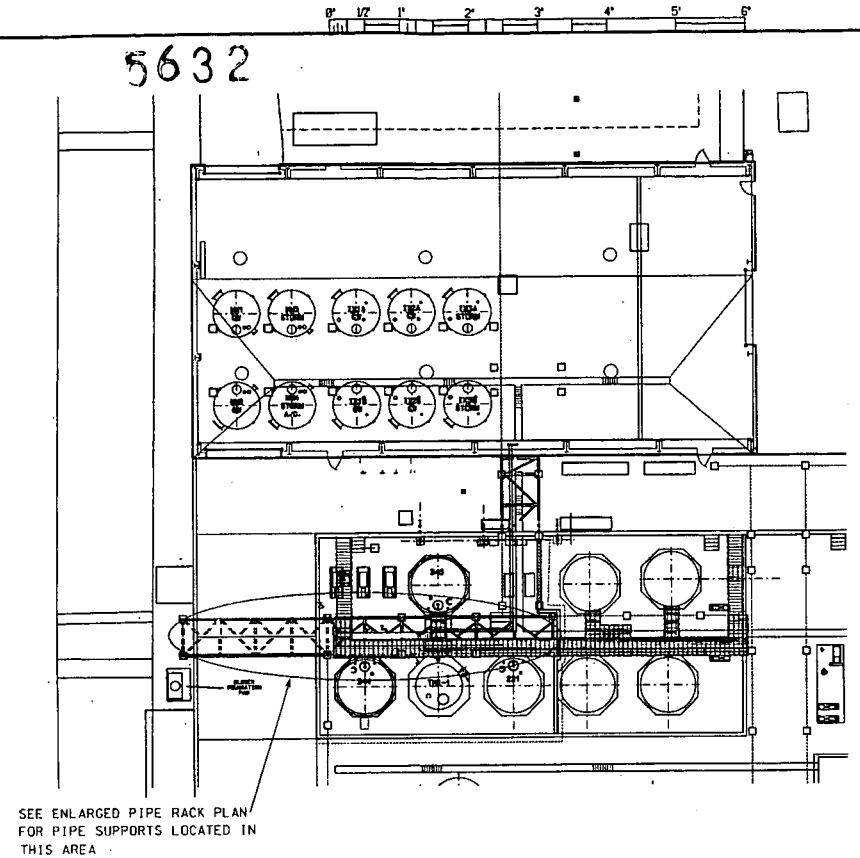
PROJECT 59600		STAGE I	
BLDG. 51A		AWWT	
CONVERTED AWWT (CAWWT) OUTSIDE PIPING PLAN SCALE 1/4" = 1'-0"			
RES. 498 DATE APR 15, 04 DRAWT. S.E. PAUL		51D-5500-P-01341	



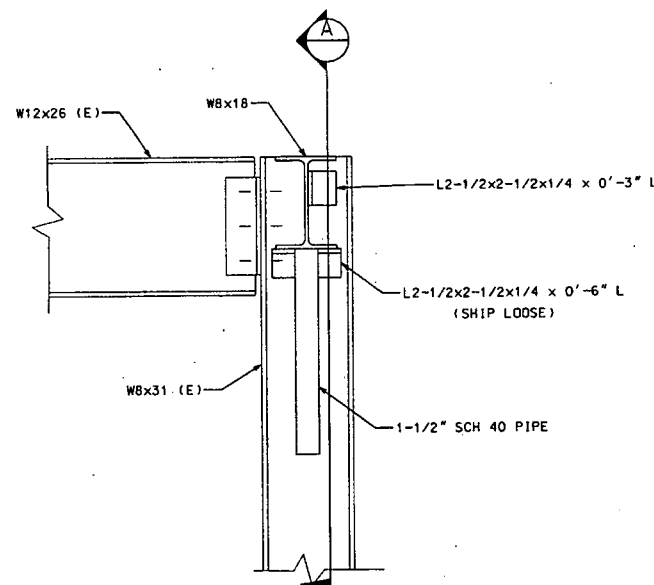
DETAIL 3  
SUPPORT AT PIPE BRIDGE  
EAST END DETAIL  
(LOOKING SOUTH)



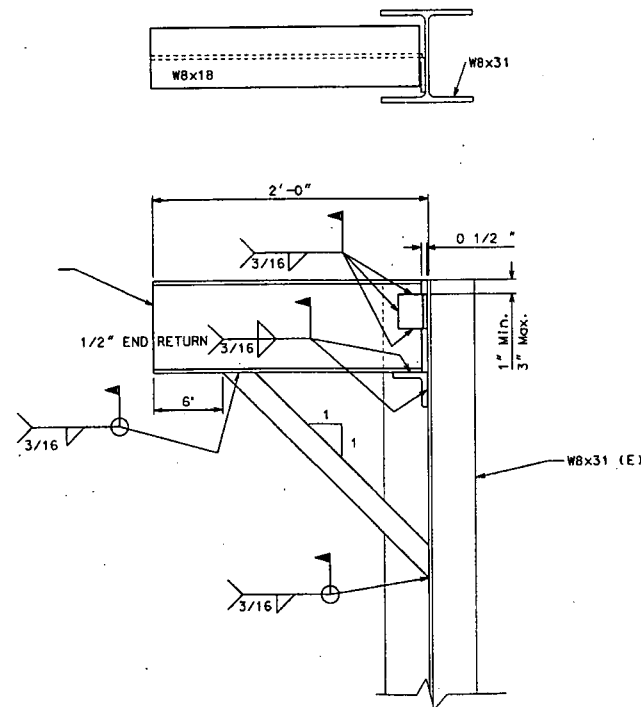
PIPE RACK PLAN



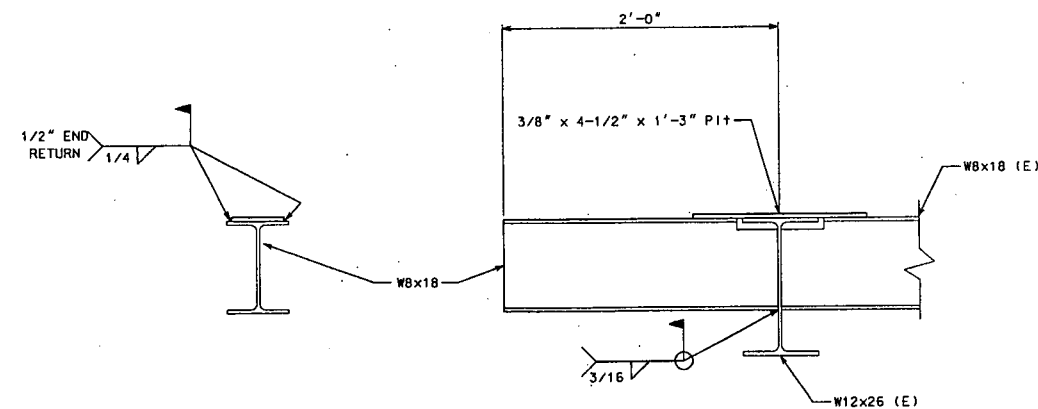
AREA MAP



DETAIL 1  
SUPPORT AT PIPE BRIDGE  
WEST END DETAIL  
(LOOKING SOUTH)



SECTION A  
(LOOKING EAST)



DETAIL 2  
SUPPORT AT PIPE BRIDGE  
INTERMEDIATE DETAIL  
(LOOKING EAST)

NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REF. DWG. NO.

NOTE:  
FLUOR FERNALD  
CADD DRAWING.  
DO NOT REVISE  
MANUALLY.

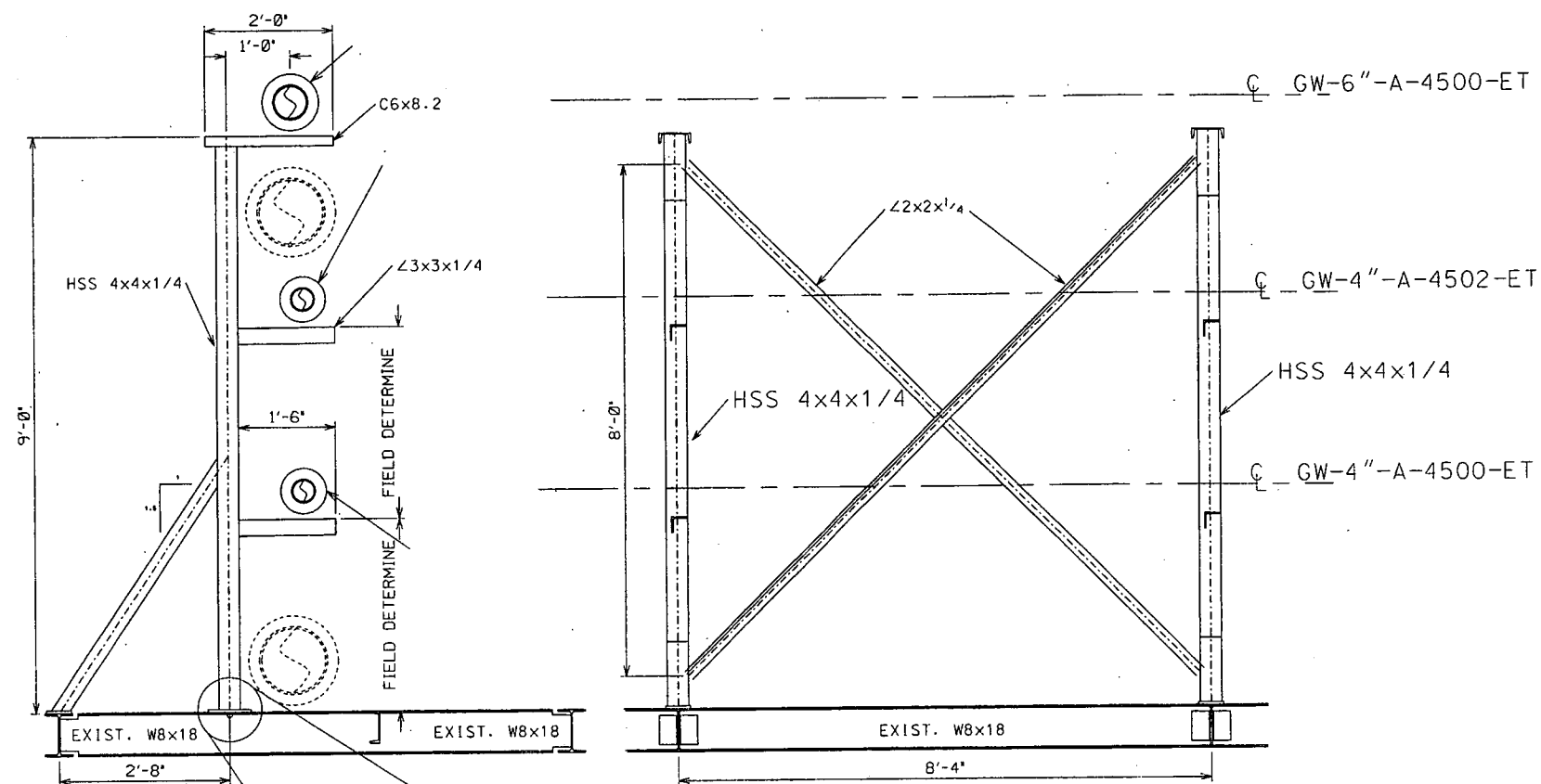
CONFIGURATION	MANAGEMENT	DRAWING
CIVIL & STR.		
ELECTRICAL		
ENGINEER		
INSTRUMENT		
MECHANICAL		
COORDINATING ENGINEER	DATE	CHECKED
		APPROVED

APPROVALS	SAFETY ENG.	MAINTENANCE	FIRE PROTECT.	WASTE MANAGE.	SECURITY	PROJECTS

Fernald Closure Project  
FLUOR FERNALD, INC.  
U.S. DEPARTMENT OF ENERGY

BLOG. 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
CONVERTED AWWT (CAWWT)	OUTSIDE PIPE BRIDGE DETAILS
NO SCALE	510-5500-S-01342
RES. 4518	DATE: JUN 25, 2004
DATE: JUN 25, 2004	DRAWN: MJB

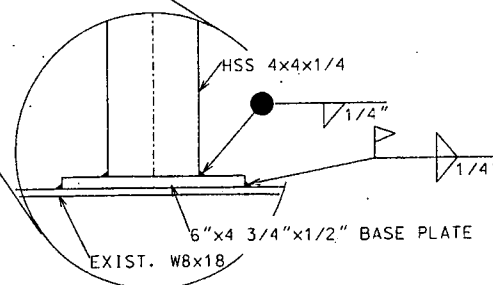
FILE NAME: res4518/caawwt/51ds1342.dgn



SUPPORT ON PIPE BRIDGE  
TYP. SUPPORT DETAIL - (3 REQ'D)  
(LOOKING EAST)

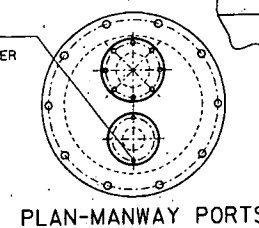
(LOOKING NORTH)

DETAIL  
CONNECTION ENLARGEMENT



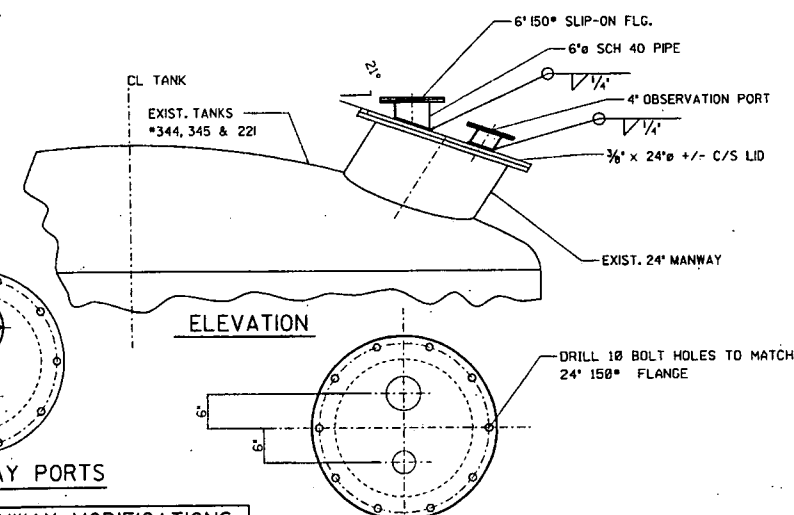
51D-5500-P-01341  
51D-5500-S-01342

PROVIDE A 3/8" LEXAN COVER  
W/ WINGNUTS TOP & BOTTOM ON CENTER



PLAN-MANWAY PORTS

MANWAY MODIFICATIONS  
TANK'S; 344, 345 & 221



PLAN-MANWAY LID

NO.	REVISIONS	DATE	DWN.	BY	APPD.	NO.	REVISIONS	DATE	DWN.	BY	APPD.	REF. DWG. NO.

NOTE:  
FLUOR FERNALD  
CADD DRAWING.  
DO NOT REVISE  
MANUALLY.

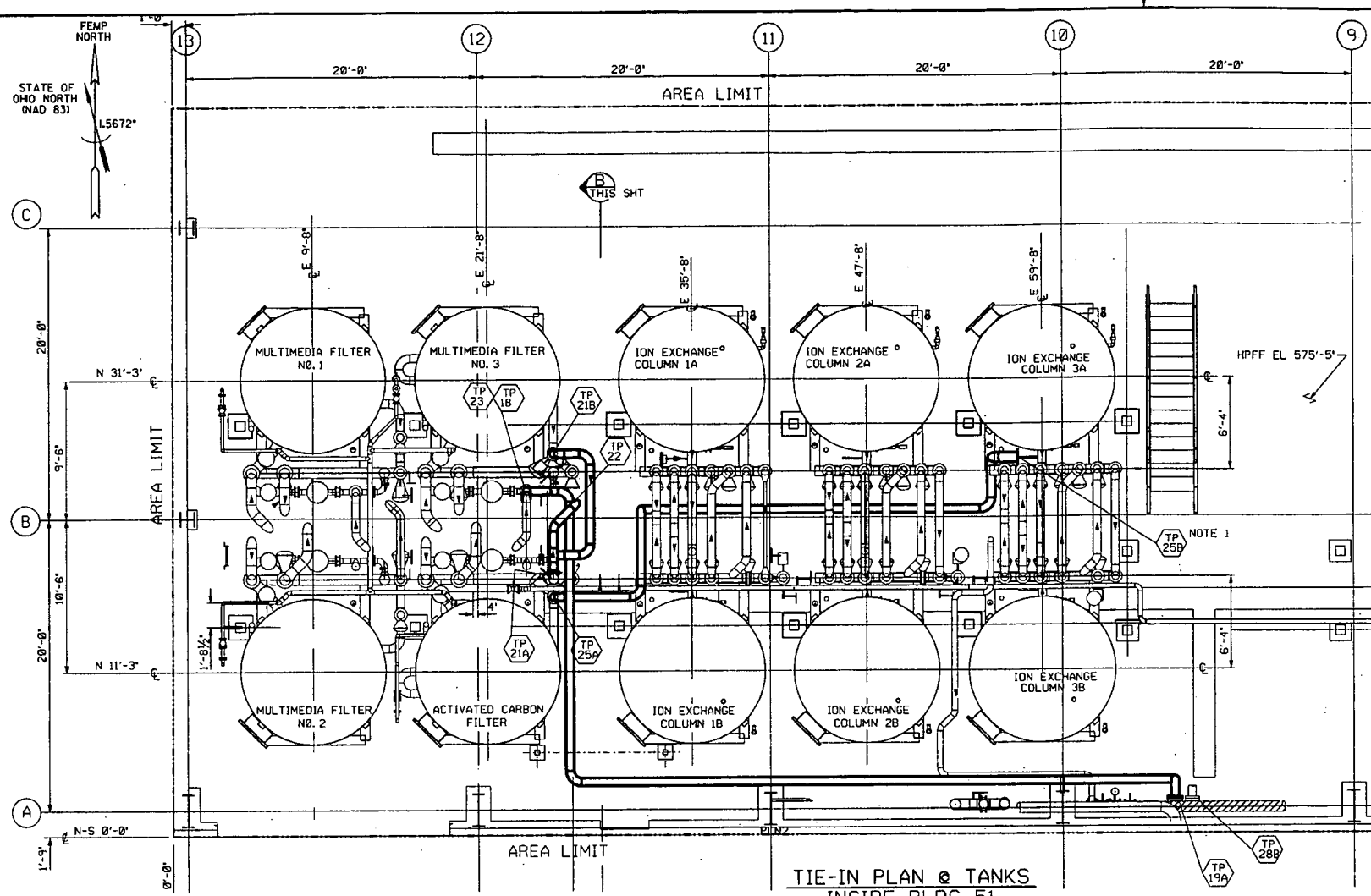
CONFIGURATION MANAGEMENT DRAWING	DATE
ISSUED FOR CONSTRUCTION	1/20/04 JNG
90% REVIEW	6/25/04 JG
COORDINATING ENGINEER	DATE

APPROVALS	DATE
CIVIL & STR.	
ELECTRICAL	
ENGINEER	
INSTRUMENT	
MECHANICAL	
CHECKED	1/20/04 JNG
APPROVED	6/25/04 JG

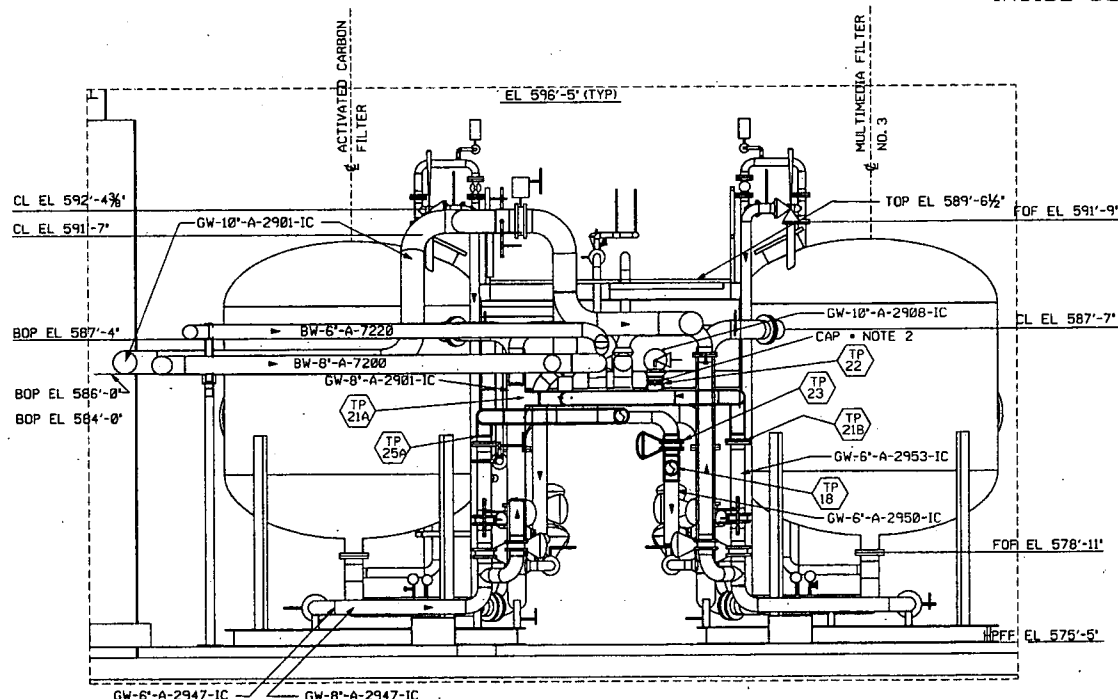
Fernald Closure Project  
**FLUOR FERNALD, INC.**  
U.S. DEPARTMENT OF ENERGY

BLDG. 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
CONVERTED AWWT (CAWWT)	PIPE SUPPORT & MISC. DETAILS
NO SCALE	51D-5500-S-01343
RES 450	0
DATE 6/22/04	
DRAWN J. COLOSBERG	

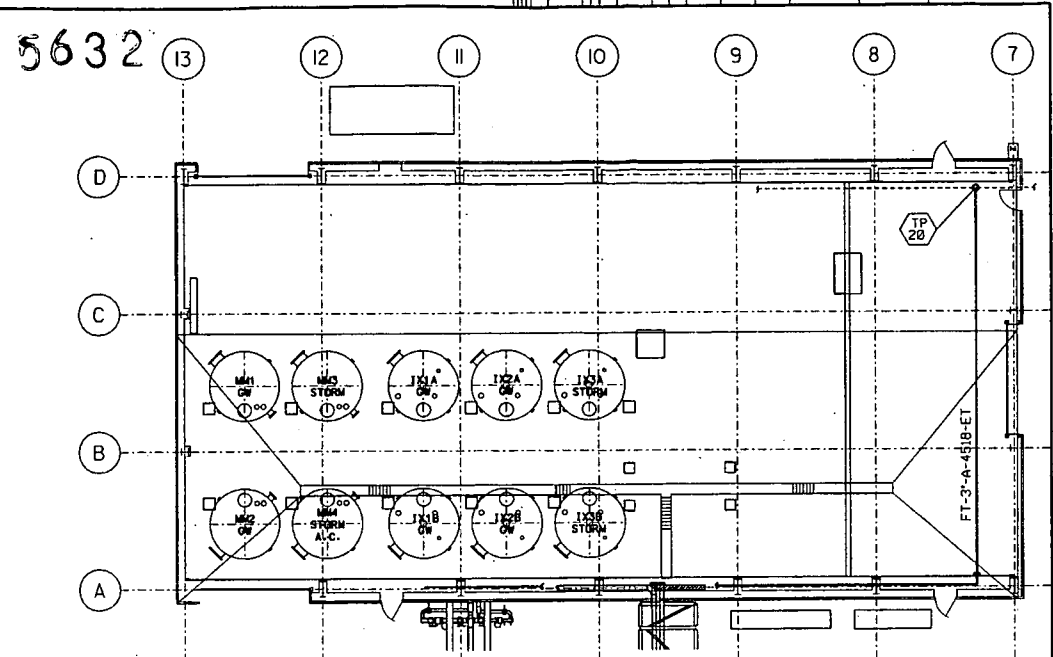
FILE NAME: res450/caawwt/51d51343.dgn



TIE-IN PLAN @ TANKS  
INSIDE BLDG. 51



SECTION (B) REF  
THIS SHEET



TIE-IN PLAN  
INSIDE BLDG. 51

NOTES:

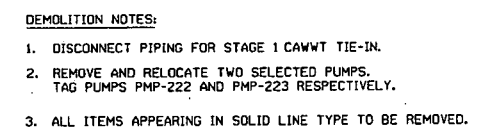
1. REFER TO PIPING ISOMETRIC DRAWINGS IN SPECS. FOR DETAIL AT TIE-IN POINTS.
2. CUT PIPE AT TEE AND CAP.

NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REVISIONS	DATE	OWN.	BY	APPD.	REF. DWG. NO.

NOTE: FLUOR FERNALD CADD DRAWING, DO NOT REVISE MANUALLY.		CONFIGURATION MANAGEMENT DRAWING		APPROVALS		Fernald Closure Project		BLDG. 51A	
CIVIL & STR.		ELECTRICAL		SAFETY ENG.		MAINTENANCE		CONVERTED AWWT (CAWWT)	
ENGINEER		INSTRUMENT		FIRE PROTECT.		WASTE MANAGE.		INSIDE TIE-IN PLANS & SECTIONS	
MECHANICAL		MECHANICAL		SECURITY		PROJECTS		SCALE: AS NOTED	
CHECKED		APPROVED		DATE		U.S. DEPARTMENT OF ENERGY		RES. 458	
APPROVED		APPROVED		DATE				DATE	
								JUN 25 2004	
								510-5500-P-01344	
								0	
								FILE NAME: /RES4518/510P1341.DGN	





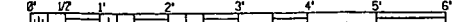


PROJECT NO. 59600

RES #450	51D-5500-X-01332	0
DATE 6/8/04		
DRAWN S.J.SMOCK		

FILE NAME: /BFS4518/CAWWT/5IDXI332.DGN

BLDG. 51A      ADVANCED WASTEWATER TREATMENT (AWWT)  
 CONVERTED AWWT (CAWWT)  
 PIPING & INSTRUMENTATION DIAGRAM  
 DEMOLITION  
 SHT. 1 OF 7



1. REMOVE EXISTING SCOURING AIR PIPING.
2. REMOVE EXISTING BLOWDOWN AIR PIPING.
3. ALL ITEMS APPEARING IN SOLID LINE TYPE TO BE REMOVED.

DEMO OR ABANDON  
IN PLACE AS DIRECTED

13	1A-1'-A-3015	510-5500-N-01321	50
1A		FROM INSTRUMENT AIR HEADER	
15	1A-1'-A-3017	510-5500-N-01321	52
1A		FROM INSTRUMENT AIR HEADER	
	GW-10'-A-2908-1C	95X-5900-N-003621	13
		FROM MULTIMEDIA FILTERS NO. 3 & 4	
	GW-6'-A-2911-1C	2 95X-5900-N-00261	
		TO ION EXCHANGE TRAIN NO. 1	
	GW-6'-A-2912-1C	3 95X-5900-N-00262	
		TO ION EXCHANGE TRAIN NO. 2	
	GW-6'-A-2910-1C	4 95X-5900-N-00263	
		TO ION EXCHANGE	

PROJECT NO. 59600

BLDG 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
----------	--------------------------------------

CONVERTED AWWT (CAWWT)  
PIPING & INSTRUMENTATION DIAGRAM  
DEMOLITION  
SHT. 2 OF 7

RES #458	51D-5500-X-01333	0
DATE 6/8/04		

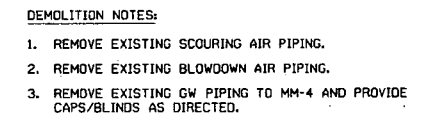
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NOTE:  
FLUOR FERNANDEZ  
CADD DRAWING  
DO NOT REVISE  
MANUALLY.

SYSTEMS, STRUCTURES OR COMPONENTS  
DEPICTED ON THIS DRAWING ARE IN  
CONFIGURATION MANAGEMENT CONTROL.  
SEE NOTES.

COGNIZANT ENGINEER DA

APPROVALS	
CIVIL & STR.	SAFETY ENGR.
ELECTRICAL	MAINTENANCE
ENGINEER	FIRE PROTECT.
INSTRUMENT	WASTE MANAGE
MECHANICAL	SECURITY
	PROJECTS
CHECKED	
APPROVED	



MODIFICATION NOTES:

1. ALL ITEMS APPEARING IN SOLID LINE TYPE TO BE REMOVED.

PROJECT NO. 59600

BLOG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)

CONVERTED AWWT (CAWWT)  
PIPING & INSTRUMENTATION DIAGRAM  
DEMOLITION  
SHT. 3 OF 7

51D-5500-X-01334	0
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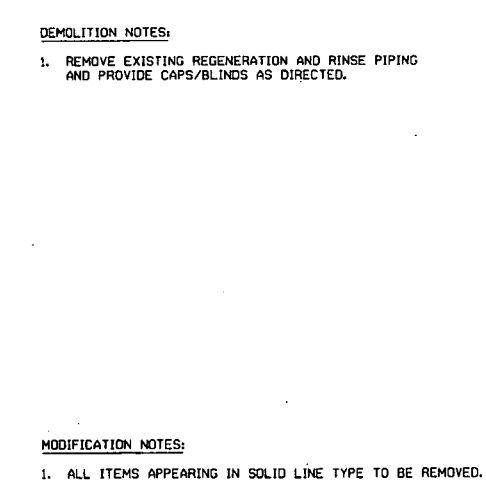
NOTE:  
FLOOR FERN  
CADD DRAWING  
DO NOT REVE  
MANUALLY

**CONFIGURATION  
MANAGEMENT  
DRAWING**

YES
NO

SYSTEMS, STRUCTURES OR COMPONENTS  
REFLECTED ON THIS DRAWING ARE UNDER  
CONFIGURATION MANAGEMENT CONTROL.  
SEE NOTES.

APPROVALS			
CIVIL & STR.			SAFETY ENG.
ELECTRICAL			MAINTENANCE
ENGINEER			FIRE PROTECT.
INSTRUMENT.			WASTE MNGM.
MECHANICAL			SECURITY
			PROJECTS
CHECKED	JSC for		
APPROVED :	a Bul		



DEMO

PROJECT NO. 59601

BLDG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)  
 CONVERTED AWWT (CAWWT)  
 PIPING & INSTRUMENTATION DIAGRAM  
 DEMOLITION  
 SHT. 4 OF 7.

51D-5500-X-01335	0
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FILE NAME: /RES4518/CAWWT/SIDX1335.DGN

REF. DWG.S  
51D-5500-X-01324

													SID-5500-X-01332	
													SID-5500-X-01333	
													SID-5500-X-01334	
													SID-5500-X-01335	
													SID-5500-X-01336	
													SID-5500-X-01337	
						O	ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION	M/W	JMC				SID-5500-X-01338	
						B	90% REVIEW	V/SW	SJS				95X-5900-N-0028	
NO.	REVISIONS		DATE	DWN.	BY	APPD.	NO.	REVISIONS		DATE	DWN.	BY	APPD.	REF. DWG. NO.

NOTE:  
FLUOR FERN  
CADD DRAWN  
DO NOT REV  
MANUALL

CONFIGURATION  
MANAGEMENT  
DRAWING

STATUS: STRUCTURES OR COMPONENTS  
LOCATED IN THIS DRAWING ARE UNDER  
CONFIGURATION MANAGEMENT CONTROL.  
SEE NOTES.

APPROVALS				
CIVIL & STR.			SAFETY ENG.	
ELECTRICAL			MAINTENANCE	
ENGINEER			FIRE PROTECT.	
INSTRUMENT			WASTE MANAGE.	
MECHANICAL			SECURITY	
			PROJECTS	
CHECKED	1562 For			
APPROVED	W. Paul			

Fernald Closure Project

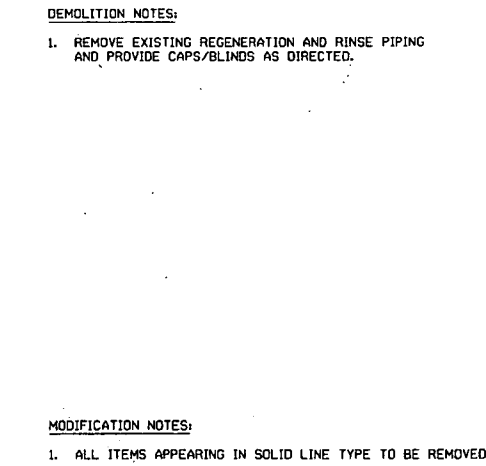
**FLUOR FERNALD, INC.**

U.S. DEPARTMENT OF ENERGY



NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.
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CODEZANT ENGINEER	DATE	CHECKED	1/20/87				
		APPROVED	G. Paul				




PROJECT NO. 59600

BLDG. 51A      ADVANCED WASTEWATER TREATMENT (AWWT)  
CONVERTED AWWT (CAWWT)  
PIPING & INSTRUMENTATION DIAGRAM  
DEMOLITION:  
SHT. 6 OF 7.

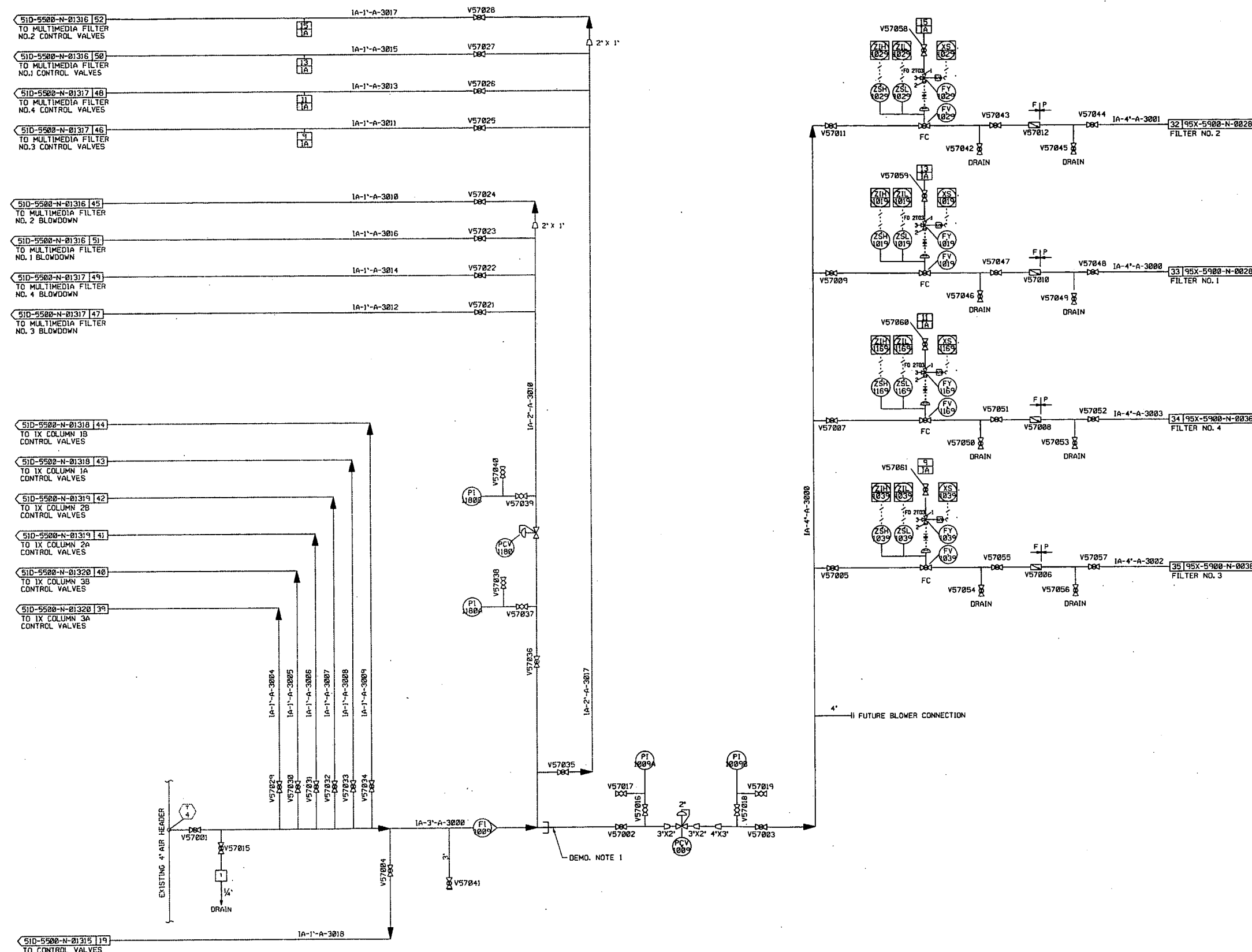
Fernald Closure Project

**FLUOR FERNALD, INC.**

U.S. DEPARTMENT OF ENERGY



5632



- DEMOLITION NOTES:
1. REMOVE EXISTING SCOURING AIR HEADERS AND CAP/BLIND PIPING AS DIRECTED.
  2. ALL ITEMS APPEARING IN SOLID LINE TYPE TO BE REMOVED.

DEMO

REF. DWG.S  
51D-5500-X-01324

NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REVISIONS	DATE	OWN.	BY	APPD.	NO.	REF. DWG. NO.

NOTE:  
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CADD DRAWING.  
DO NOT REVISE  
MANUALLY.

CONFIGURATION  
MANAGEMENT  
DRAWING

APPROVALS

CIVIL & STR.	SAFETY ENG.
ELECTRICAL	MAINTENANCE
ENGINEER	PRE. PROTECT.
INSTRUMENT	WASTE MNGMT.
MECHANICAL	SECURITY
	PROJECTS

CHECKED: [Signature] DATE: [Date]  
APPROVED: [Signature] DATE: [Date]

Fernald Closure Project

FLUOR FERNALD, INC.

U.S. DEPARTMENT OF ENERGY

PROJECT NO. 59600

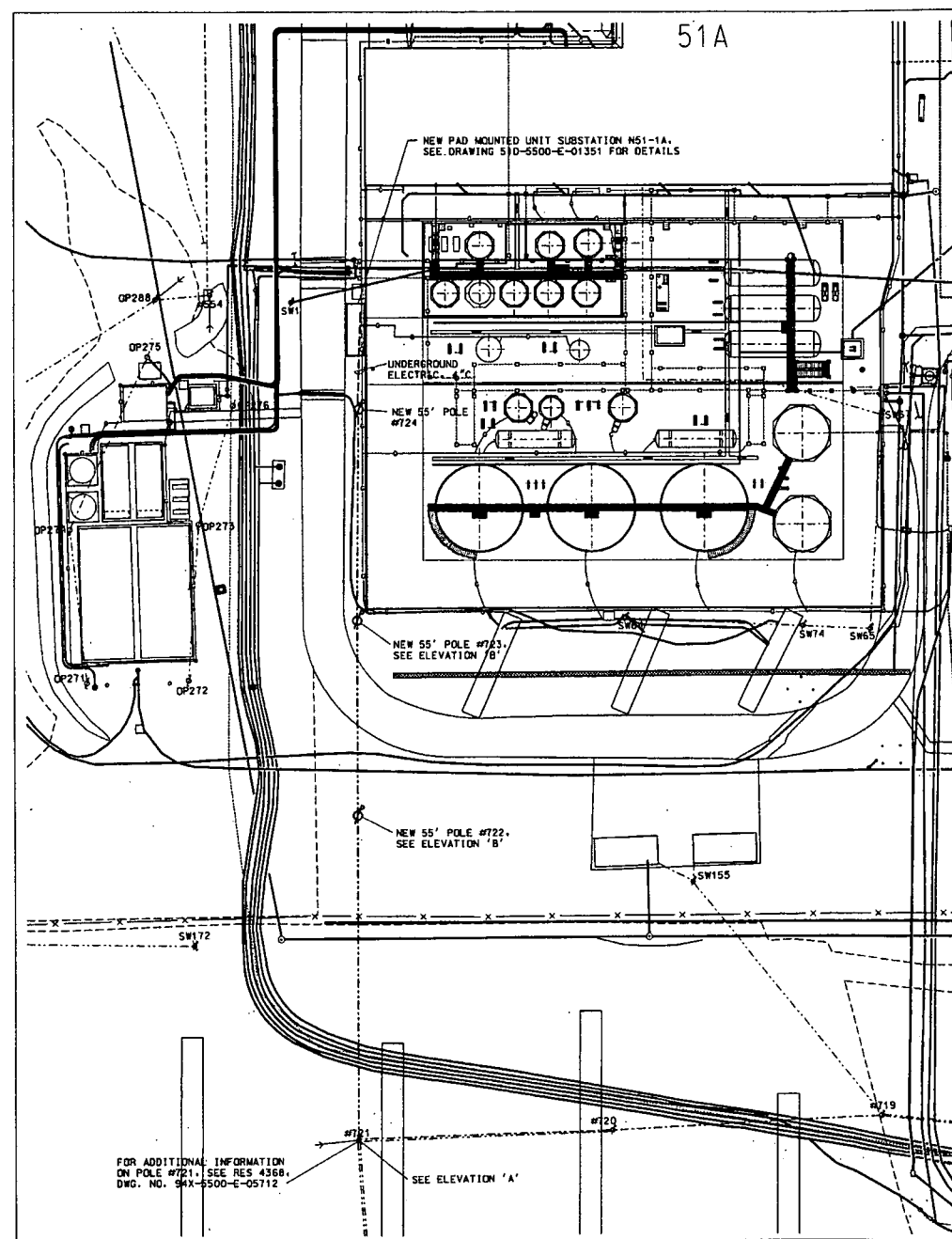
BLDG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)  
CONVERTED AWWT (CAWWT)  
PIPING & INSTRUMENTATION DIAGRAM  
DEMOLITION  
SHT. 7 OF 7

RES. #438  
DATE: 6/7/04  
DRAWN: S.J.SMOCK

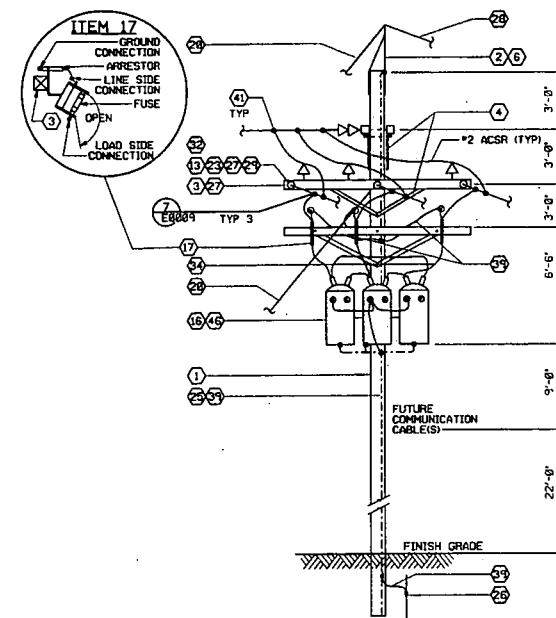
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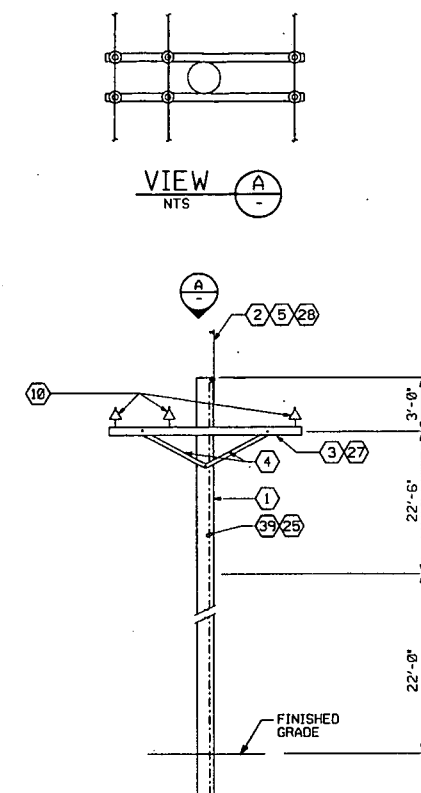




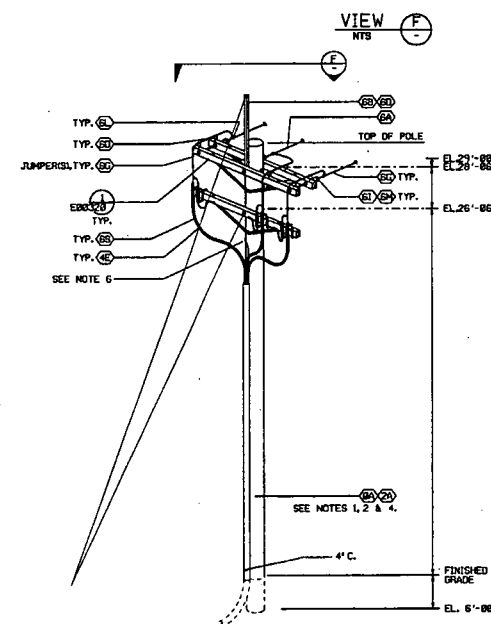
PLAN  
SCALE: 1"=30'-0"



ELEVATION A  
POLE #721  
SEE NOTE 2



ELEVATION B  
POLES #722 & 723  
SEE NOTE 2



ELEVATION C  
POLE #724  
SEE NOTE 1

- NOTES:
- SEE DRAWING 96X-5900-E-00320 FOR COMPLETE ITEM NUMERIC/ALPHA TAG LIST.
  - SEE DRAWING 92X-5900-E-00408 FOR COMPLETE ITEM NUMERIC TAG LIST.

NO.	REVISIONS	DATE/DWN. BY/APPD. NO.	ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION	DATE/DWN. BY/APPD. NO.	REF. DWG. NO.
0					

NOTE:  
FLUOR FERNALD  
CADD DRAWING,  
DO NOT REVISE  
MANUALLY.

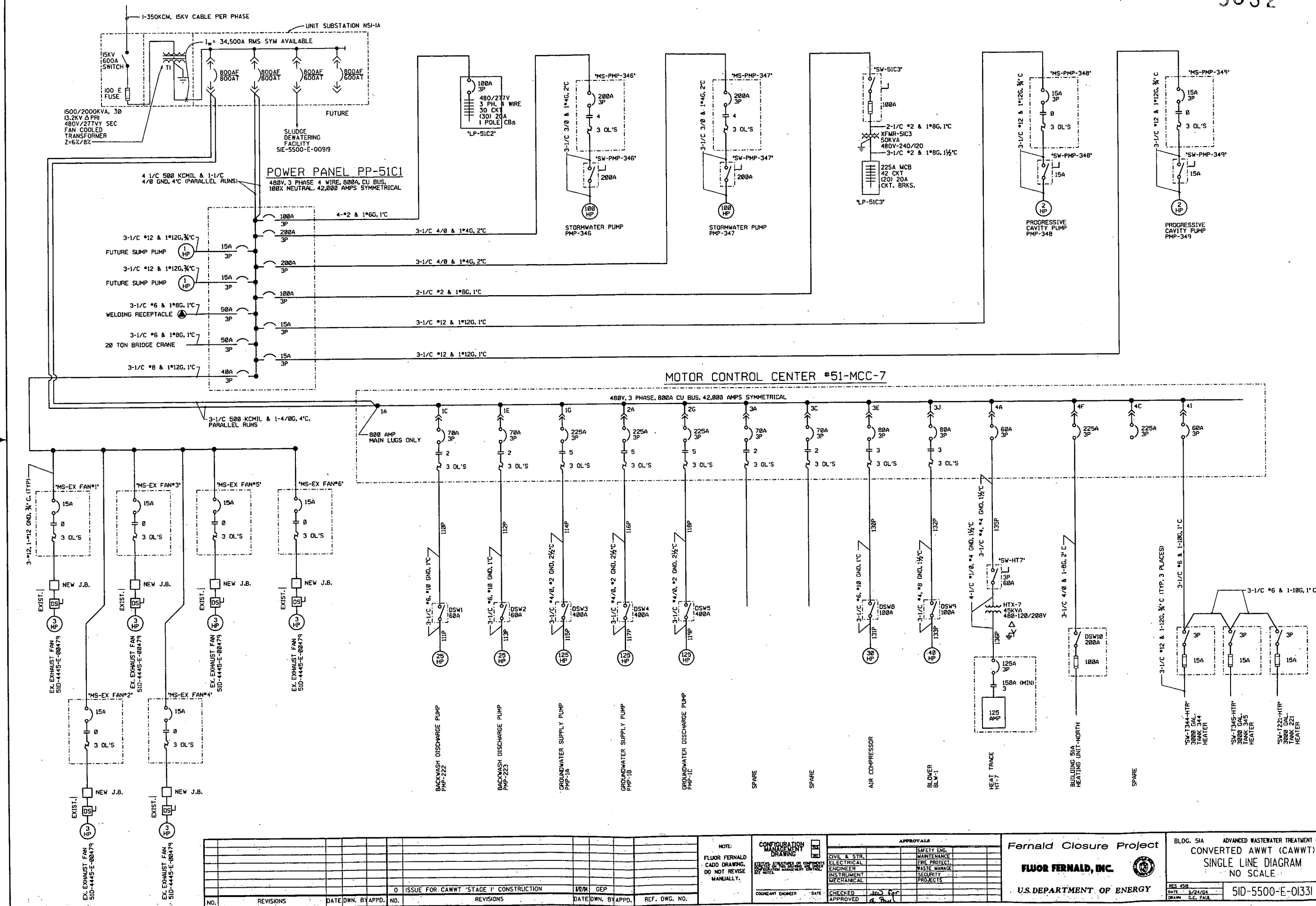
<b>CONFIGURATION MANAGEMENT DRAWING</b>	ISS
	REV
	NO
SYSTEMS, STRUCTURES OR COMPONENTS EXISTING OR BEING DELETED ARE INDICATED ON CONFIGURATION MANAGEMENT CONTROL SHEET. SEE NOTES.	
COCOA/ANT ENGINEER	DATE

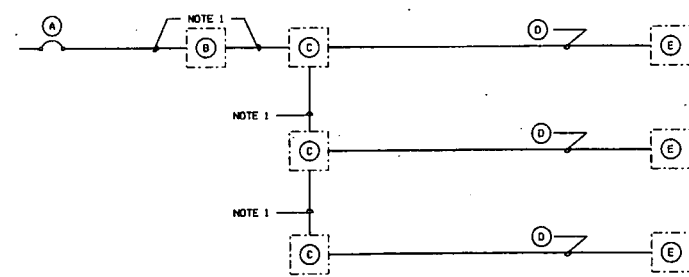
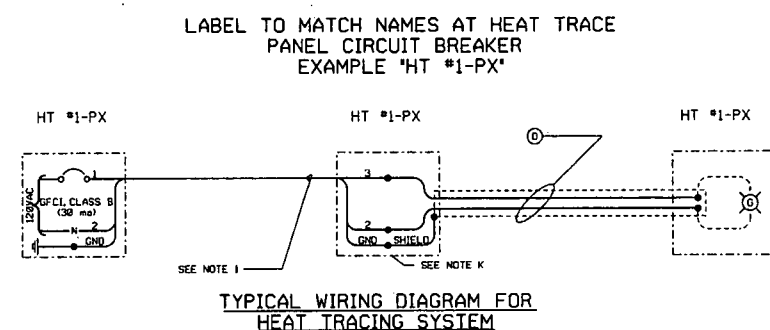
APPROVALS			
CIVIL & STR.		SAFETY ENG.	
ELECTRICAL		MAINTENANCE	
ENGINEER		FIRE PROTECT.	
INSTRUMENT		WASTE MANAGE	
MECHANICAL		SECURITY	
		PROJECTS	
CHECKED	15/04/95		
APPROVED	G. Bui		

Fernald Closure Project  
FLUOR FERNALD, INC.  
U.S. DEPARTMENT OF ENERGY

BLDG. 51A	ADVANCED WASTEWATER TREATMENT (AWWT)
CONVERTED AWWT (CAWWT)	
13.2KV SERVICE POLE ROUTING	
PLAN, ELEVATIONS & DETAILS	
RES 4518, PROJ. #3600	
DATE: JULY 14, 2004	
DRAWN: G.E. PAUL	
51D-5500-E-01353	0







## INSTALLATION NOTES

- A. HEAT TRACING SYSTEM SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
- B. HEAT TRACING SYSTEMS SHALL BE MARKED NOTICEABLY WITH WARNING SIGNS (AVAILABLE FROM MANUFACTURER AT 18'-0" (NORMAL) INTERVALS.
- C. FASTEN HEAT TRACE CABLE TO PIPE LINES USING ADHESIVE TAPE, CHEMELEX CAT NO GT-66 OR EQUAL.
- D. INSTALL HEAT TRACE CABLE ON FITTINGS, VALVES, ETC. SO THAT HEAT TRACE CAN BE READILY MOVED ASIDE WHEN MAINTENANCE IS REQUIRED. SEE SCHEDULE FOR REQ'D. WATTAGE.
- E. PROVIDE STAINLESS STEEL IDENTIFICATION TAGS AT ALL DEVICES AND MARK ASSEMBLY WITH CIRCUIT NUMBERS.
- F. CONNECT GROUND WIRE TO GROUND TERMINATIONS PROVIDED IN POWER CONNECTION BOXES OR THERMOSTAT BOX.
- G. NOT USED
- H. PILOT LIGHTS SHALL BE INSTALLED AT THE END OF HEAT TRACE CIRCUIT AND SHALL BE LOCATED SO AS TO BE EASILY VISIBLE.
- I. NOT USED.
- J. NOT USED.

GENERAL NOTES:  
1. CONDUIT SHALL BE 3/4"

1. CONDUIT SHALL BE 3/4" UNLESS OTHERWISE NOTED.  
WIRING SHALL BE 3-1/4" #12 WITH 20A C.B. OR  
3-1/4" #10 WITH 30A C.B. UNLESS OTHERWISE NOTED.
2. NOT USED.
3. ALL BREAKERS TO BE 20A, OR 30A, 1 POLE, 30MA  
EQUIPMENT PROTECTION GFCI BREAKERS.
4. NOT USED.
5. CONTRACTOR TO COMPLETE PANEL SCHEDULE INFO  
IE PIPE SIZE IN INCHES AND SHOW ON REDLINES.
6. NOT USED.
7. PIPE MATERIAL IS CARBON STEEL WITH  
2" FIBERGLASS INSULATION UNLESS OTHERWISE NOTED.

LEGEND:

\*HEAT TRACE CIRCUIT #1 - PIPE SIZE X  
PIPE SIZE IN INCHES

## HEAT TRACE SCHEDULE

PIPE SIZE	CABLE WATTAGE	MAX. LENGTH (20A 120V)	MAX. LENGTH (30A 120V)
1 1/2" & SMALLER	3 WATTS/FT.	265'	330'
1 1/2" TO 3"	5 WATTS/FT.	185'	270'
3" TO 6"	8 WATTS/FT.	130'	200'
6"	10 WATTS/FT.	105'	155'
10" & 12"	12 WATTS/FT.	90'	135'

[illegible]

NOTE:  
FLUOR FERNALD  
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DO NOT REVISE  
MANUALLY.

<b>CONFIGURATION MANAGEMENT DRAWING</b>	YES
	NO

SYSTEMS, STRUCTURES OR COMPANY  
PROPERTY ON THIS DRAWING ARE UNDER  
CONFIGURATION MANAGEMENT CONTROL.  
SEE NOTES.


COGNIZANT ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

APPROVALS				
CIVIL & STR.			SAFETY ENG.	
ELECTRICAL			MAINTENANCE	
ENGINEER			FIRE PROTECT.	
INSTRUMENT			WASTE MNGT.	
MECHANICAL			SECURITY	
			PROJECTS	
CHECKED				
APPROVED				

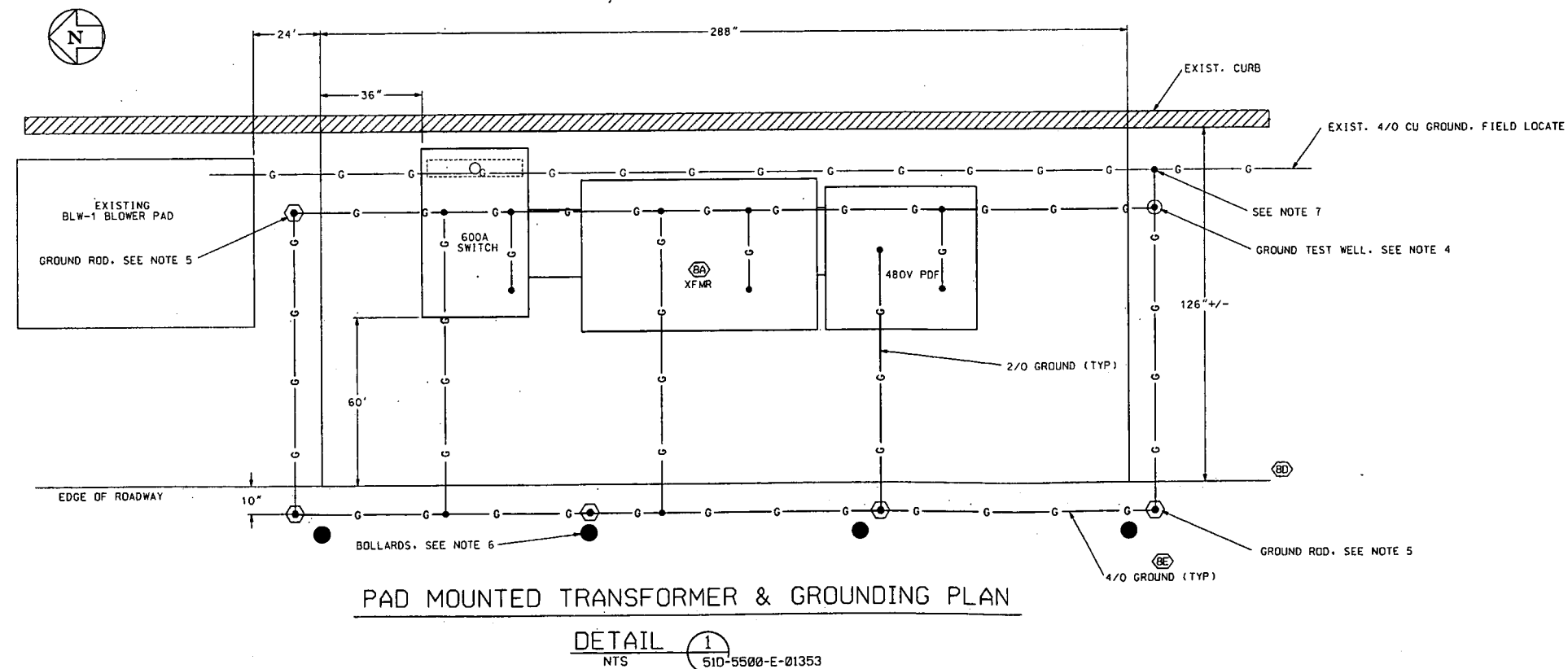
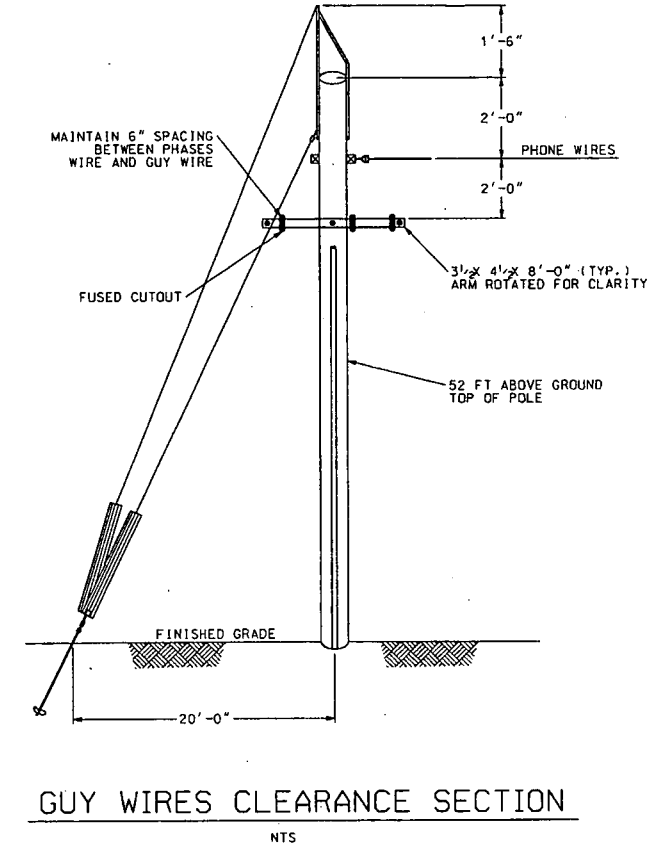
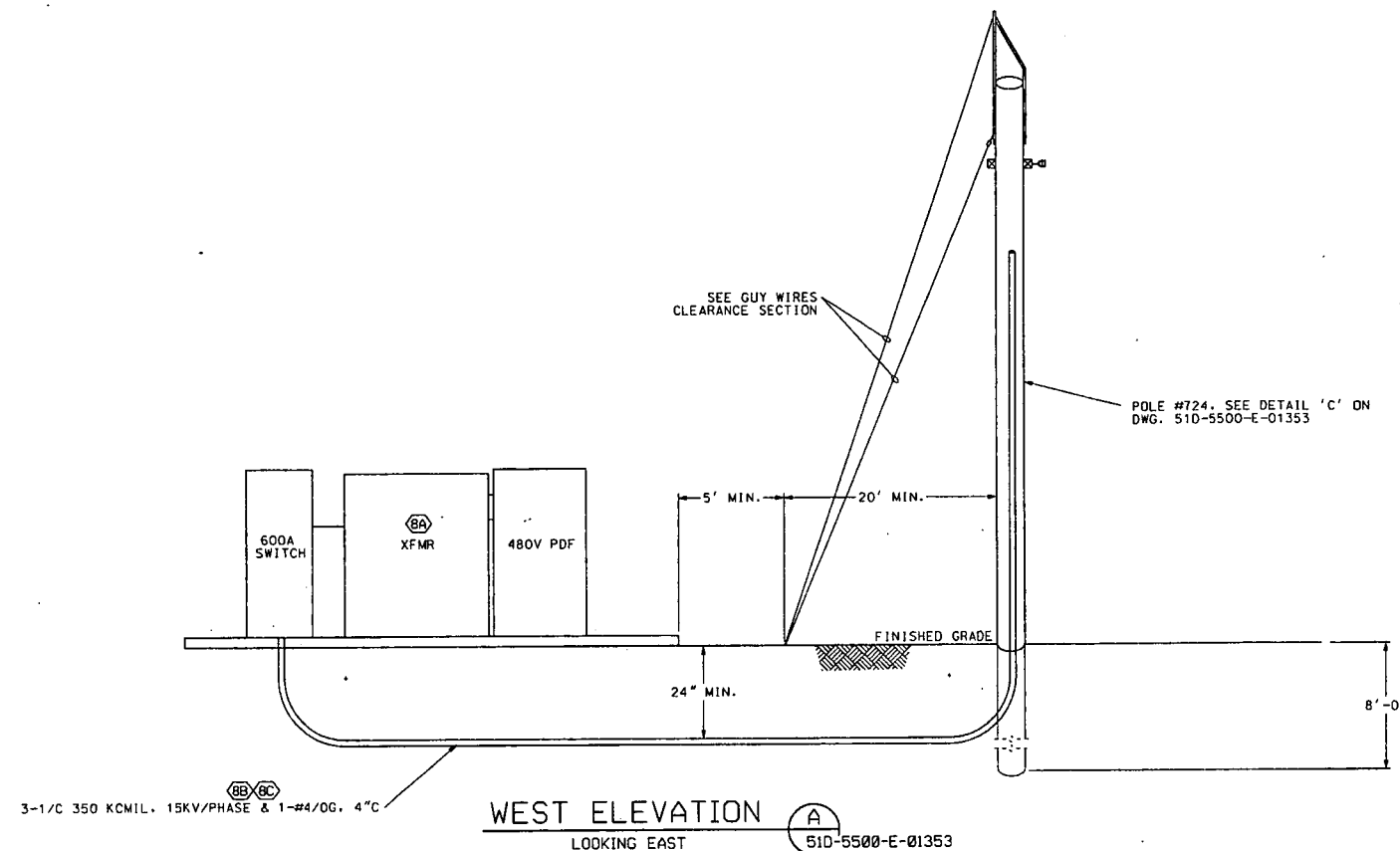
**Fernald Closure Project**

**FLUOR FERNALD, INC.**

**U.S. DEPARTMENT OF ENERGY**



BLDG. 51A      ADVANCED WASTEWATER TREATMENT (AWWT)			
CONVERTED AWWT (CAWWT)			
ELECTRICAL HEAT TRACE			
DETAILS, NOTES & SCHEDULE			
RES 458		51D-5500-E-O1355	
DATE 1/22/04		0	
DRAWN G.E. PAUL			



ITEM TAG	DESCRIPTION
(BA)	TRANSFORMER, POWER-DRY 1500KVA, 13.2KV-480/277V
(BB)	4" RGS CONDUIT.
(BC)	15 KVA POWER CABLE 1/2", 1-350KCM/PHASE CU EPR OUTDOOR CABLE
(BD)	GRD. ROD. COPPERCLAD STEEL 3/4"x8'-0" LONG WITH GRD. ROD TO CABLE CLAMP (CU COMPRESSION TYPE OR EXOTHERMIC WELD).
(BE)	GRD COND., #4/0 STRANDED BARE COPPER.

- NOTES:
1. THE GRD GRID IS TO BE BURIED A MIN. OF 2'-6" WHERE THE GRD. GRID CROSSES A DUCT BANK. THE GRD. GRID IS TO BE BURIED BELOW THE DUCT BANK.
  2. BOND THE CONDUCTOR SHIELDS AND THE ARRESTORS GRD. LEADS TO A #2 AWG BARE COPPER CONDUCTOR. USING SUITABLE CONNECTORS, CONNECT THIS CONDUCTOR TO THE XFMR TANK GRD. LUG.
  3. INSTALL THE XFMR AND PAD PER MANUFACTURER'S INSTRUCTIONS.
  4. FOR GROUND TEST WELL DETAIL, SEE DWG. 510-4445-E-00481
  5. FOR GROUND ROD DETAIL, SEE DWG. 510-4445-E-0481
  6. FOR STANDARD BOLLARD DETAIL, SEE DWG. 00X-5500-S-02652
  7. CONNECT PAD GROUND GRID TO EXISTING BUILDING GROUND GRID WITH APPROVED BONDING METHODS.

NO.	REVISIONS	DATE	DWN. BY	APPD. NO.	ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION	DATE	DWN. BY	APPD. NO.	REF. DWG. NO.

NOTE: FLUOR FERNALD CADD DRAWING, DO NOT REVISE MANUALLY.

CONFIGURATION MANAGEMENT DRAWING

DATE: 10/24/2004

DESIGNED BY: G. PAUL

CHECKED BY: G. PAUL

APPROVED BY: G. PAUL

DATE: 10/24/2004

FILE NAME: RES4518/510E1351.DGN

APPROVALS

CIVIL & STR. ENGINEER	SAFETY ENG.
ELECTRICAL ENGINEER	MAINTENANCE
INSTRUMENT MECHANICAL	WASTE MGMT.
	SECURITY
	PROJECTS

**Fernald Closure Project**

**FLUOR FERNALD, INC.**

**U.S. DEPARTMENT OF ENERGY**

BLDG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)

CONVERTED AWWT (CAWWT)

ELECTRICAL POLE & TRANSFORMER ELEVATIONS & DETAILS

RES. 4518

DATE: 10/24/2004

DRAWN: G.E. PAUL

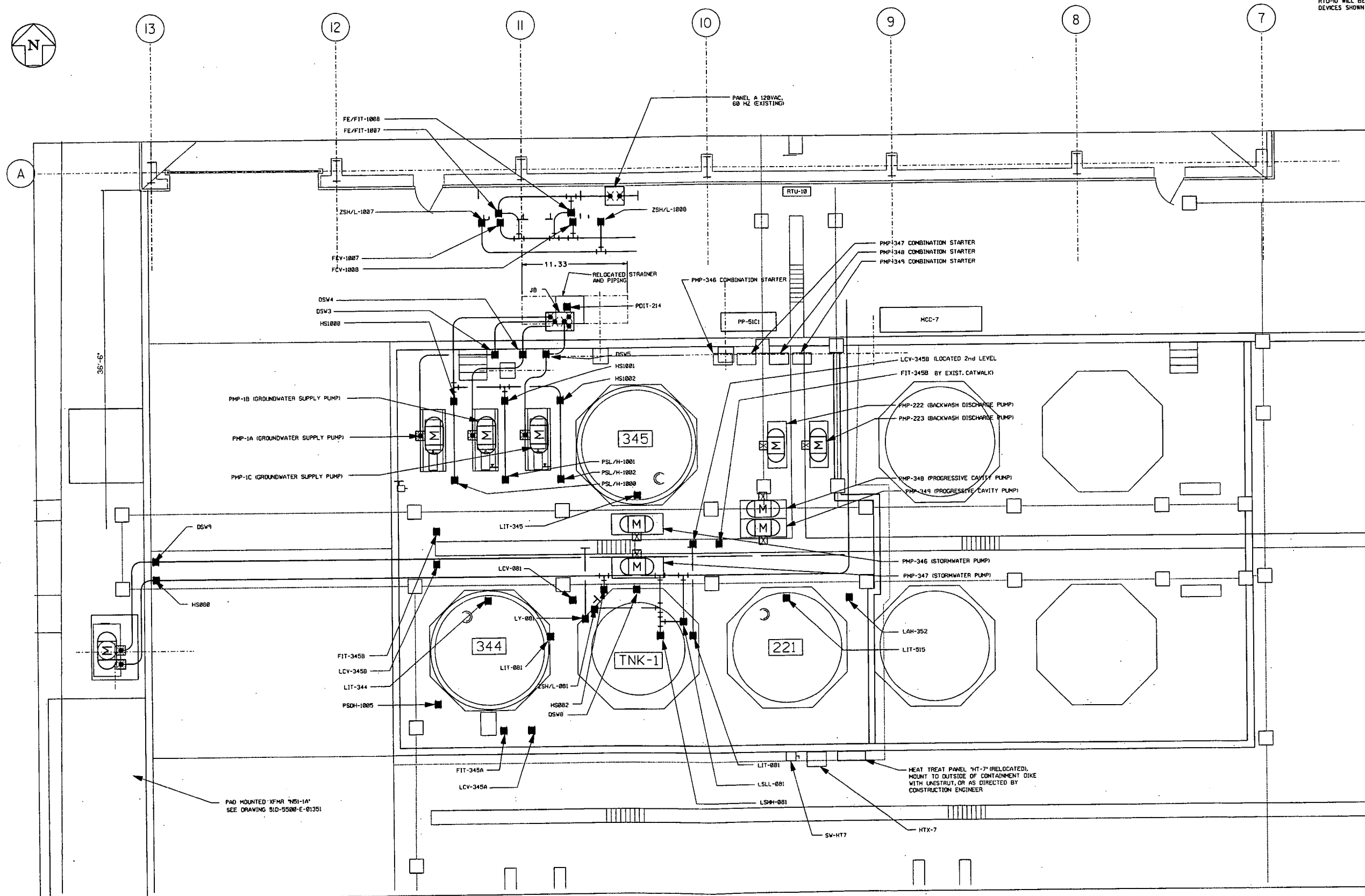
510-5500-E-01353

5632

NOTES:

CONDUIT FOR CONTROL AND POWER WIRING SHALL BE FIELD ROUTED. CONSTRUCTION MANAGER SHALL RESOLVE FIELD CONFLICTS WITH PIPING, EXISTING CONDUIT, ETC.

RTU-10 WILL BE USED FOR ALL CONTROL DEVICES SHOWN ON THIS DRAWING.



NO.	REVISIONS	DATE/DWN. BY	APPD. NO.	REVISIONS	DATE/DWN. BY	APPD. NO.	REF. DWG. NO.
0	ISSUE FOR CAWWT 'STAGE I' CONSTRUCTION	10/01	JMG				

NOTE:  
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MANUALLY.

CONFIGURATION  
MANAGEMENT  
DRAWING

COORDINATOR ENGINEER DATE

CHECKED  
APPROVED

APPROVALS

SAFETY ENG.  
MAINTENANCE  
FIRE PROTECT.  
WASTE MANAGE.  
SECURITY  
PROJECTS

Fernald Closure Project

FLUOR FERNALD, INC.

U.S. DEPARTMENT OF ENERGY

PROJECT 59600 STAGE I  
BLDG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)

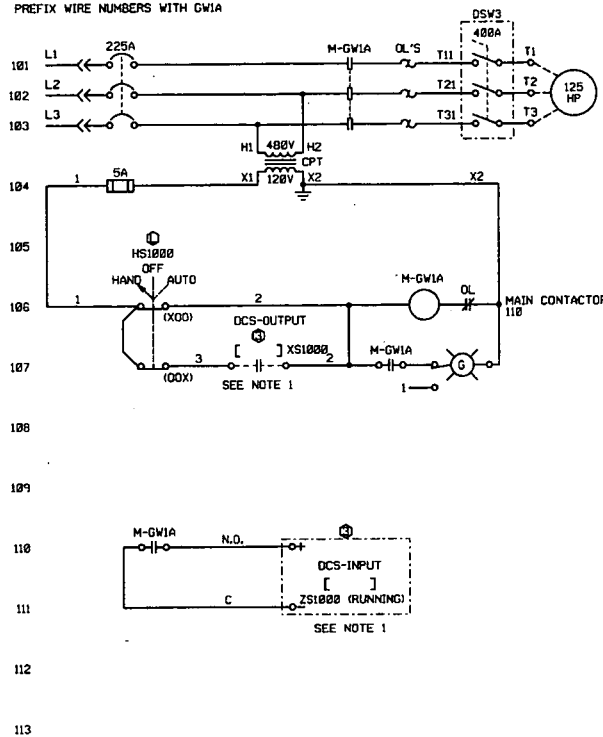
CONVERTED AWWT (CAWWT)  
INSTRUMENT & POWER PLAN  
SCALE 1/4" = 1'-0"

RES. 458  
DATE JUN 16, 04  
DRAWN C.E. PAUL  
51D-5500-E-01347 0

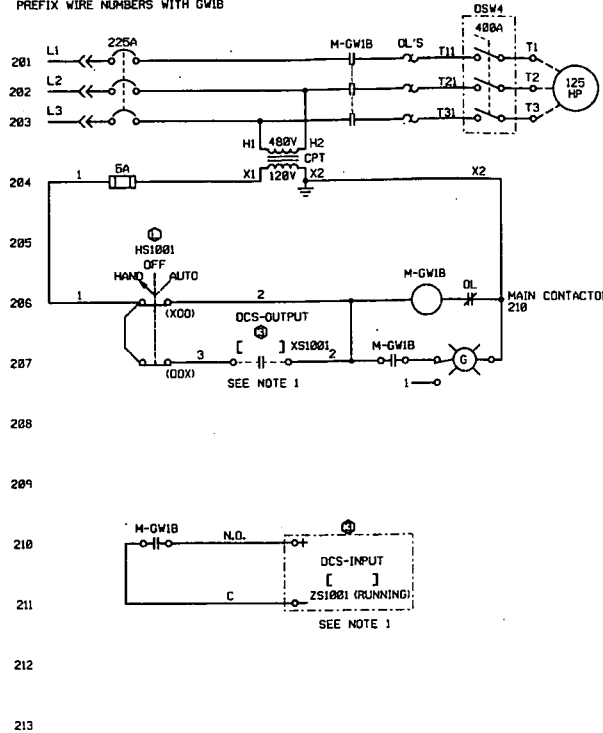
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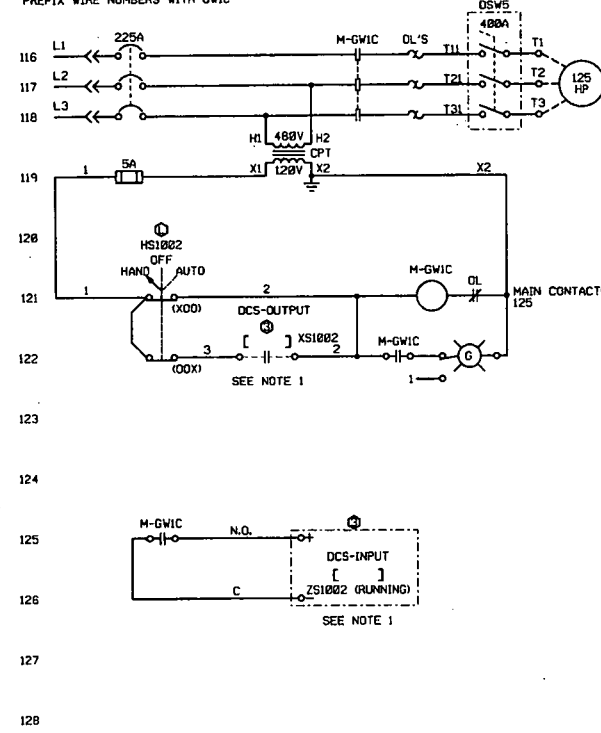
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EQUIPMENT NO. : PMP-1A  
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PLAN DWG NO. : 95X-5900-E-00303  
PREFIX WIRE NUMBERS WITH GW1A



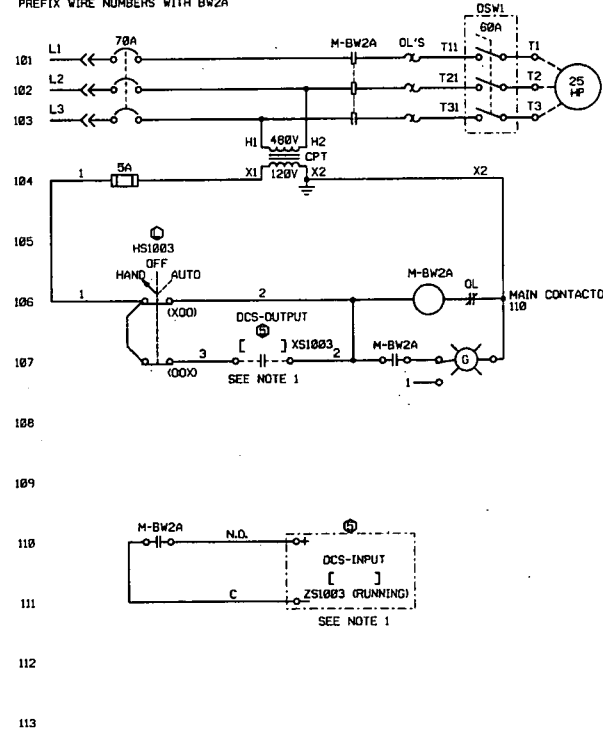
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EQUIPMENT NO. : PMP-1B  
S/L DWG NO. : 510-5500-E-01331 INTERCONNECTION DIAGRAM : 95X-5900-E-00306  
PLAN DWG NO. : 95X-5900-E-00303  
PREFIX WIRE NUMBERS WITH GW1B



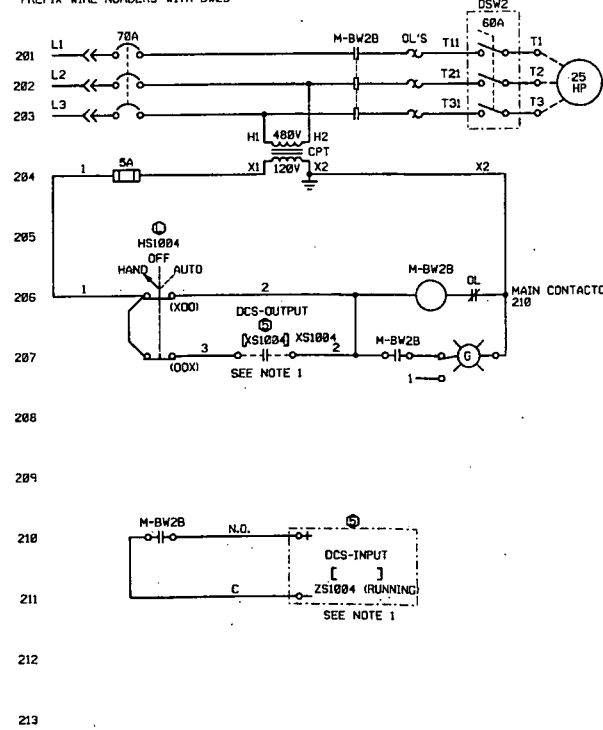
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EQUIPMENT NO. : PMP-1C  
S/L DWG NO. : 510-5500-E-01331 INTERCONNECTION DIAGRAM : 95X-5900-E-00306  
PLAN DWG NO. : 95X-5900-E-00303  
PREFIX WIRE NUMBERS WITH GW1C



EQUIPMENT NAME : BACKWASH SUPPLY PUMP 2A  
EQUIPMENT NO. : PMP-2A  
S/L DWG NO. : 510-5500-E-01331 INTERCONNECTION DIAGRAM : 95X-5900-E-00306  
PLAN DWG NO. : 95X-5900-E-00303  
PREFIX WIRE NUMBERS WITH BW2A



EQUIPMENT NAME : BACKWASH SUPPLY PUMP 2B  
EQUIPMENT NO. : PMP-2B  
S/L DWG NO. : 510-5500-E-01331 INTERCONNECTION DIAGRAM : 95X-5900-E-00306  
PLAN DWG NO. : 95X-5900-E-00303  
PREFIX WIRE NUMBERS WITH BW2B



# LEGEND

ALL DEVICES ARE LOCATED IN THE MCC STARTER CUBICLE  
UNLESS NOTED AS BELOW:  
① INDICATES FIELD MOUNTED LOCAL DEVICE  
② INDICATES CARD/TERMINATION LOCATED IN RTU CABINET #2  
③ INDICATES CARD/TERMINATION LOCATED IN RTU CABINET #3

# NOTE

1. SEE DUBLIN TECH. DWG. RTU0

NO.	REVISIONS	DATE	OWN. BY	APPD. NO.	REVISIONS	DATE	OWN. BY	APPD. NO.	REF. DWG. NO.

NOTE:  
FLUOR FERNALD  
CADD DRAWING.  
DO NOT REVISE  
MANUALLY.

CONFIGURATION	MANAGEMENT	DRAWING

APPROVALS	DATE

Fernald Closure Project	BLDG. 51A ADVANCED WASTEWATER TREATMENT (AWWT)
FLUOR FERNALD, INC.	CONVERTED AWWT (CAWWT)
U.S. DEPARTMENT OF ENERGY	ELEMENTARY WIRING DIAGRAM
	SHEET 2 OF 2
	510-5500-E-01349 0

FILE NAME: /RES4518/CAWWT/SIDE1349.DGN

5632

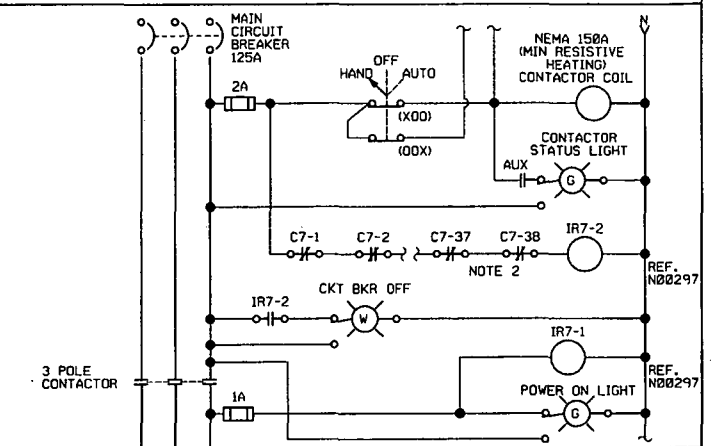
1. THERMOSTAT SHALL BE MOUNTED ON HT-7 PANEL EXTERIOR.
2. CONNECT EXISTING STATUS CONTACTS IN SERIES.
3. HEAT TRACE PANEL HT-7 TO BE RELOCATED. EXISTING REROUTED PIPING TO BE HEAT TRACED LIKE THE ORIGINAL. NEW PIPING TO BE HEAT TRACED PER SPECIFICATION SECTION 16855 (PROJ. NO. 59600 & RES 4518).

# HEAT TRACE PWR DIST PNL HT-7

VOLTAGE : 208Y/120 VOLT 3PH, 4 WIRE  
MAIN BKR : 125 AMP  
MOUNTING : SURFACE

REMARKS : 1. \*\* INDICATES SPACE FOR 30MA GFCI CLASS B BREAKER WITH B AUXILIARY STATUS CONTACT. BREAKERS WILL BE INSTALLED AS NEEDED.

MAIN BUS : 225 AMP



DIRECTORY	WATTS LOAD			WIRE SIZE	BKR AMP	L1 L2 L3			WIRE SIZE	BKR AMP	L1 L2 L3			DIRECTORY
	L1	L2	L3											
CKT BKR STATUS				1	30	**			20	2				CIRCUIT #2
CIRCUIT #1														CKT BKR STATUS
CKT BKR STATUS				3	20	**			20	4				CIRCUIT #4
CIRCUIT #3														CKT BKR STATUS
CKT BKR STATUS				5	20	**			20	6				CIRCUIT #6
CIRCUIT #5														CKT BKR STATUS
CKT BKR STATUS				7	20	**			20	8				CIRCUIT #8
CIRCUIT #7														CKT BKR STATUS
CKT BKR STATUS				9	20	**			20	10				CIRCUIT #10
CIRCUIT #9														CKT BKR STATUS
CKT BKR STATUS				11	20	**			20	12				CIRCUIT #12
CIRCUIT #11														CKT BKR STATUS
CKT BKR STATUS				13	20	**			20	14				CIRCUIT #14
CIRCUIT #13														CKT BKR STATUS
CKT BKR STATUS				15	20	**			20	16				CIRCUIT #16
CIRCUIT #15														CKT BKR STATUS
CKT BKR STATUS				17	20	**			20	18				CIRCUIT #18
CIRCUIT #17														CKT BKR STATUS
CKT BKR STATUS				19	20	**			20	20				CIRCUIT #20
CIRCUIT #19														CKT BKR STATUS
SUB-TOTALS	0	0	0						0	0	0			SUB-TOTALS
	L1	L2	L3						L1	L2	L3			
TOTAL WATTS L1 : 0 TOTAL WATTS L2 : 0 TOTAL WATTS L3 : 0 TOTAL WATTS : 0														

CKT. NO.	PIPE LINE DESIGNATION	HEAT TRACE TYPE	NOTES
1	GW-12'-A-2899-ET	EXISTING	GROUNDWATER SUPPLY; TIE POINT AT WEST PIPE RACK TO TNK-1 NOZZLE N1
1A	GW-10'-A-2899-ET	EXISTING	GROUNDWATER SUPPLY; LCV-081 BY-PASS
2	GW-12'-A-2900-ET	EXISTING	GROUNDWATER SUPPLY; FROM TNK-1 NOZZLE N4 TO GROUNDWATER PUMPS SUCTION MANIFOLD
2A	GW-8'-A-2900-ET	EXISTING	GROUNDWATER SUPPLY; PUMP 1A SUCTION
2B	GW-8'-A-2902-ET	EXISTING	GROUNDWATER SUPPLY; PUMP 1B SUCTION
2C	GW-8'-A-2904-ET	EXISTING	GROUNDWATER SUPPLY; PUMP 1C SUCTION
3	GW-10'-A-2901-ET	EXISTING	GROUNDWATER SUPPLY; GROUNDWATER PUMPS DISCHARGE MANIFOLD TO INSIDE BLOC 51.
3A	GW-8'-A-2901-ET	EXISTING	BACKWASH SUPPLY; PUMP 1A DISCHARGE
3B	GW-8'-A-2903-ET	EXISTING	GROUNDWATER SUPPLY; PUMP 1B DISCHARGE
3C	GW-8'-A-2905-ET	EXISTING	GROUNDWATER SUPPLY; PUMP 1C DISCHARGE
4	GW-6'-A-4500-ET	8W/LF	TP-10 TO TANK 345
5	BW-8'-A-4512-ET	10W/LF	TANK 221 TO TP-12 AND TANK 344
6	GW-6'-A-4509-ET	8W/LF	TP-14 TO TANK 344
7	GW-8'-A-4501-ET	10W/LF	TP-15A TO TP-15B
8	FT-10'-A-4526-ET	12W/LF	TP-16A TO (SPEC CHANGE) FT-12' B4 (INCLUDING RELOCATED STRAINER)
9	CE-8'-A-4516-ET	10W/LF	TANK 345 TO EXISTING CE-6' 4516-1C (INSIDE CAWWT)
10	BW-6'-A-7204-ET	8W/LF	TP-19A TO TANK 221 (INCLUDING EXISTING 6' DILUTE ACID LINE)
11	GW-2'-A-2955-ET	EXISTING	AERATION TANK TNK-1; NOZZLE N-10 DRAIN & LSL-081 CONNECTION
12	BW-8'-A-7200-ET		
12A	BW-6'-A-7200-ET		
13	BW-8'-A-7200-ET		
14	BW-8'-A-7220-ET		
14A	FT-3'-A-4518-ET	5W/LF	TP-20 TO TANK 345
14B	SL-2'-A-4520-ET	5W/LF	PROGRESSIVE CAVITY PUMPS TO TANK 221
14C	CE-6'-A-4528-ET	8W/LF	OVERFLOW TANK 344 TO TANK 345
15	SU-2'-A-4519-ET	5W/LF	SUMP PUMP DISCHARGE TO TANK 344
15A			
15B			
15C			
16	N/A	N/A	NOT USED
17	N/A	N/A	NOT USED
18	N/A	N/A	NOT USED
19	N/A	N/A	NOT USED
20	N/A	N/A	NOT USED

HEAT TRACE POWER DISTRIBUTION PANEL HT-7

NO. REVISIONS DATE DWN. BY APPD. NO.				ISSUED FOR CAWWT 'STAGE 1' CONSTRUCTION				DATE DWN. BY APPD. REF. DWG. NO.			
0				0				0			

NOTE: FLUOR FERNALD CADD DRAWING. DO NOT REVISE MANUALLY.

CONFIGURATION MANAGEMENT DRAWING

SAFETY ENG. MAINTENANCE

CIVIL & STR. ELECTRICAL ENGINEER

INSTRUMENT MECHANICAL

CHECKED: JSC/10/1

APPROVED: JSC/10/1

APPROVALS

SAFETY ENG. MAINTENANCE

CIVIL & STR. ELECTRICAL ENGINEER

INSTRUMENT MECHANICAL

CHECKED: JSC/10/1

APPROVED: JSC/10/1

Fernald Closure Project

FLUOR FERNALD, INC.

U.S. DEPARTMENT OF ENERGY

BLOC 51A ADVANCED WASTEWATER TREATMENT (AWWT) CONVERTED AWWT (CAWWT) HEAT TRACE PANEL SCHEDULE NO SCALE

RES 4518

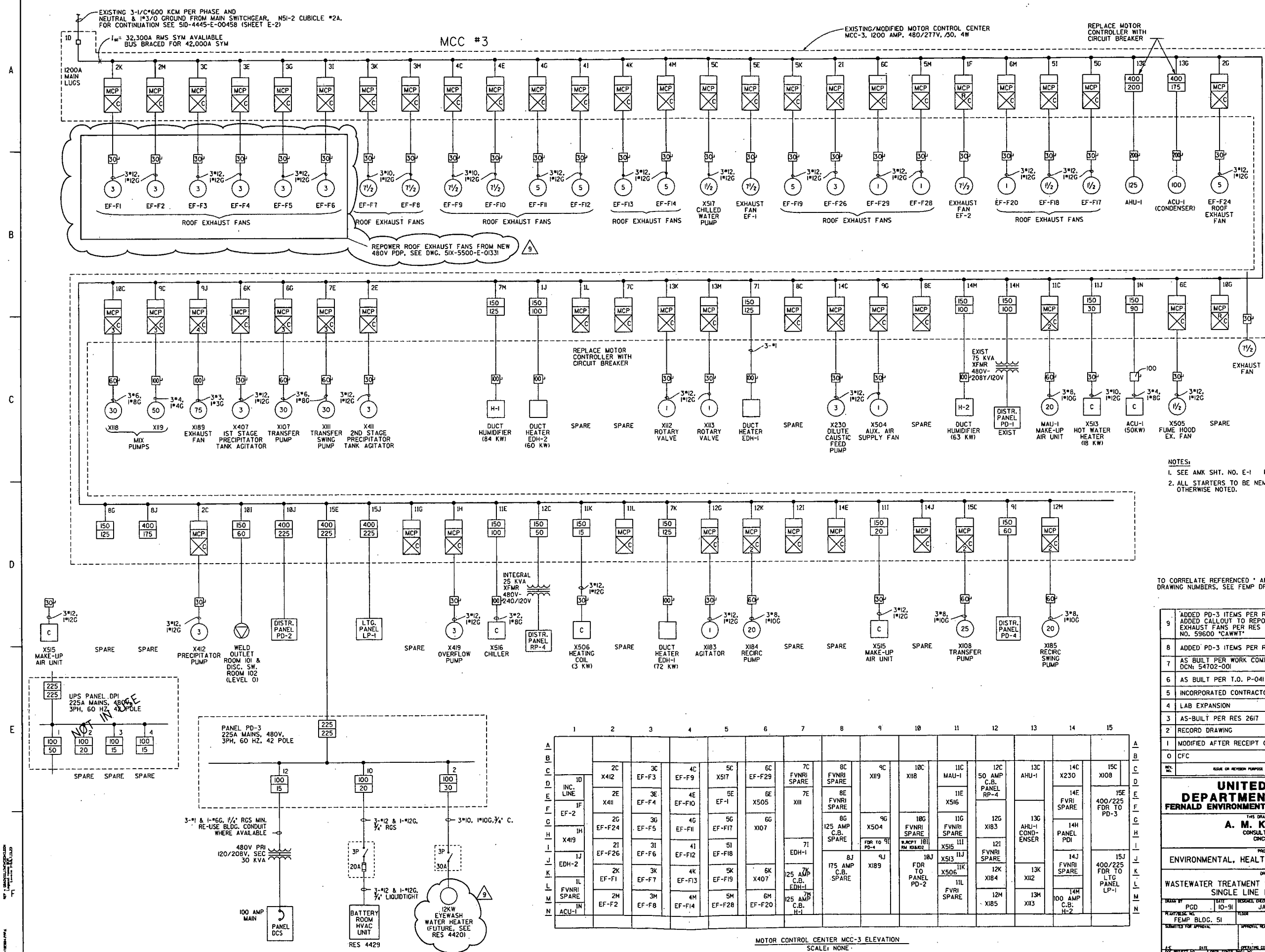
DATE: 5/24/04

DRAWN: C.E. PAUL

510-5500-E-01350

FILE NAME: /RES4518/CAWWT/SIDE1350.DGN

5632



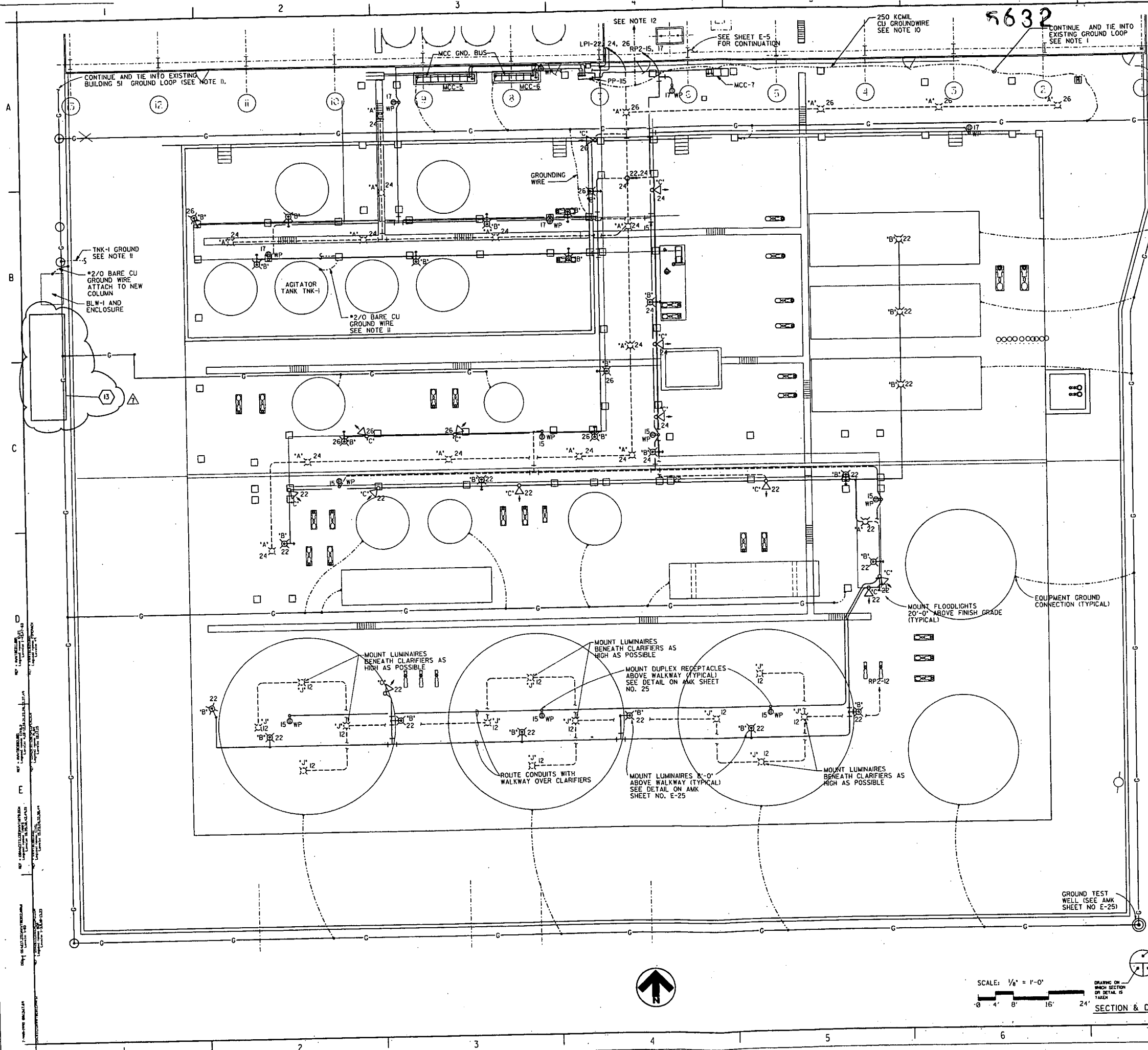
- NOTES:
- SEE AMK SHT. NO. E-1 FOR SYMBOLS LEGEND.
  - ALL STARTERS TO BE NEMA SIZE 1 UNLESS OTHERWISE NOTED.

TO CORRELATE REFERENCED \* AMK SHEET NO.'S \* TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING NO.: 510-4445-X-00425 & 510-4445-X-00426

9	ADDED PD-3 ITEMS PER RES 4429 & 4420, ADDED CALLOUT TO REPOWER ROOFTOP EXHAUST FANS PER RES 4518, PROJECT NO. 59600 "CAWWT"	REVISED	DATE	BY
8	ADDED PD-3 ITEMS PER RES 4429 & 4420	REVISED	4/16/03	SEP
7	AS BUILT PER WORK COMPLETED	REVISED	2/6/03	SEP
6	AS BUILT PER T.O. P-041 PHASE II	REVISED	12/10/00	SEP
5	INCORPORATED CONTRACTOR REDLINES	REVISED	12/10/00	SEP
4	LAB EXPANSION	REVISED	12/10/00	SEP
3	AS-BUILT PER RES 2617	REVISED	12/10/00	SEP
2	RECORD DRAWING	REVISED	12/10/00	SEP
1	MODIFIED AFTER RECEIPT OF BIDS	REVISED	12/10/00	SEP
0	CFC	REVISED	12/10/00	SEP

<b>UNITED STATES DEPARTMENT OF ENERGY</b>	
<b>FERNALD ENVIRONMENTAL MANAGEMENT PROJECT</b>	
THIS DRAWING PREPARED BY <b>A. M. KINNEY, INC.</b> CONSULTING ENGINEERS CINCINNATI, OHIO	
PROJECT NAME <b>ENVIRONMENTAL, HEALTH &amp; SAFETY IMPROVEMENTS</b>	
DRAWING TITLE <b>WASTEWATER TREATMENT IMPROVEMENTS - PLANTWIDE SINGLE LINE DIAGRAM MCC-3</b>	
DESIGNED BY PGD	CHECKED BY JAN
DATE 10-91	DATE 10-91
SCALE NONE	SCALE NONE
APPROVED BY JAN	
DATE 10-91	
PROJECT NO. 87-D-159	
DRAWING NO. 0087502	
SHEET NO. 510-4445-E-00459	
TOTAL SHEETS E-3 9	





NOTES

1. CONNECT GROUND WIRE TO EXISTING GROUND GRID. SEE SPECS.
2. GROUNDING PATH SHALL BE PERMANENT, CONTINUOUS AND COMPLY WITH NEC ARTICLE 250-51. SEE GROUNDING SPECS 02902-3502 SECTION 16450.
3. RUN CONDUITS AND INSTALL JUNCTION BOXES, FITTINGS SUPPORTS IN COMPLIANCE WITH THE (NEC) NATIONAL ELECTRIC CODE
4. SEE AMK SHEET NO E-25 FOR LIGHTING AND GROUNDING DETAILS.
5. FURNISH #12 GREEN GND WIRE IN ALL LIGHTING AND RECEPTACLE CONDUITS UNLESS OTHERWISE NOTED.
6. EXACT CONDUIT ROUTING AND CONDUIT ELEVATION TO BE DETERMINED AT MODEL AND/OR IN FIELD.
7. SEE AMK SHEET NO. E-26 FOR LUMINAIRE SCHEDULE.
8. SEE AMK SHEET NO. E-4 FOR SYMBOLS LEGEND.
9. ALL LIGHTING CONDUCTORS ARE TO BE #12 AWG UNLESS OTHERWISE NOTED.
10. ROUTE GROUND WIRE ALONG BASE OF BUILDING WALL. SECURE TO BUILDING EVERY 20 FEET. CONNECT TO EXISTING STRUCTURAL STEEL COLUMN.
11. ATTACH GROUND WIRE TO EXISTING STRUCTURAL STEEL COLUMN.
12. NO. 2 BARE CU GROUND WIRE TO CABLE TRAY #2 (SEE DWG. 95X-5900-N-00339).
13. CONNECT NEW SUBSTATION NSI-1A GROUND GRID TO FACILITY GROUND GRID. USE 4/0 COPPER WIRE. SEE RES 4518, DWG. 5D-5500-E-0135.

TO CORRELATE REFERENCED \* AMK SHEET No's \* TO FEMP DRAWING NUMBERS. SEE FEMP DRAWING No. 5D-4445-X-00425 & 5D-4445-X-00426

REV.	NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	DATE	BY	CHKD.
7		ADDED NOTE 13 PER RES4518 SCOPE OF WORK	1/26/04	JAR	BP

**UNITED STATES  
DEPARTMENT OF ENERGY**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

THIS DRAWING PREPARED BY  
**A. M. KINNEY, INC.**  
CONSULTING ENGINEERS  
CINCINNATI, OHIO

PROJECT NAME  
**ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS**

DRAWING TITLE  
**WASTEWATER TREATMENT IMPROVEMENTS - PLANTWIDE SOUTH CONTAINMENT - LIGHTING & GROUNDING PLAN**

DESIGNED BY	DATE	CHECKED BY	DATE	DATE	DATE
PGD	10-91	JAR	10-91	JAR	7-92

PLANT/PROJECT NO. FEMP BLDG. 51  
SCALE: 1/8" = 1'-0"  
DRAWING NO. 0087502  
SHEET NO. 7-92  
DATE 87-D-159  
WBS 112.4.0102  
5D-4445-E-00464  
E-B 7

aww10e012.001

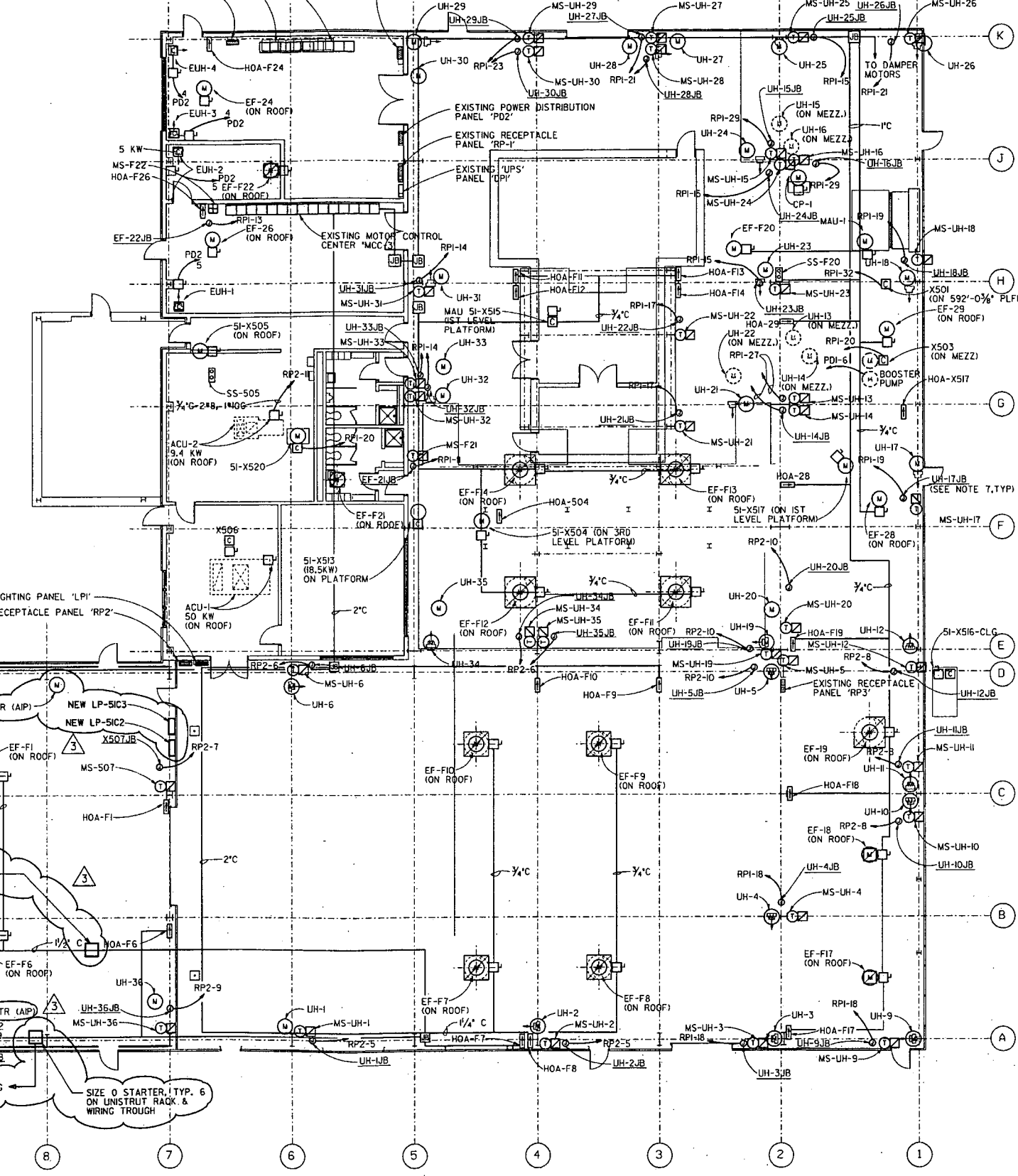
3637

NOTES

1. SEE AMK SHEET E-1 FOR ELECTRICAL SYMBOLS LEGEND
2. SEE MODEL AND AMK SHEETS NO. H-7 AND H-8 FOR EXACT LOCATIONS AND SIZES OF EQUIPMENT.
3. SEE AMK HVAC SHEET NO. H-7 AND H-8 FOR LOCATION OF TEMPERATURE SWITCHES, AIR DAMPERS AND WHETHER EQUIPMENT IS EXISTING OR NEW.
4. SEE BLOCK DIAGRAMS ON AMK SHEETS NO. E-16 AND E-18 FOR CONDUIT SIZES AND WIRES NOT SHOWN WITH HOMERUNS.
5. ALL NON-FUSED SAFETY DISCONNECTS TO HAVE NEMA 4 ENCLOSURES
6. ALL HOMERUNS ARE TO BE #12 WIRES IN 3/4" C UNLESS OTHERWISE NOTED
7. WIRE EQUIPMENT ON LOAD SIZE OF JUNCTION BOX, UH-17JB, I.E., PER HVAC ELEMENTARY DIAGRAMS AND/OR VENDOR INFORMATION.
8. LOCATE HOA'S FOR EXHAUST FANS ADJACENT TO THERMOSTATS SHOWN ON SHEET H-7 AND H-8.

EXISTING MOTOR CONTROL CENTER 'MCC-1'  
EXISTING MOTOR CONTROL CENTER 'MCC-2'  
EXISTING POWER DISTRIBUTION PANEL 'PD3'

EXISTING POWER DISTRIBUTION  
PANEL 'PD1'



TO CORRELATE REFERENCED \* AMK SHEET NO.'S \* TO FEMP  
DRAWING NUMBERS, SEE FEMP DRAWING NO. 51D-4445-X-00425 &  
51D-4445-X-00426

3	POWER RE-ROUTE WORK PER CAWWT PROJ. 51600 AND RES. 458	DATE 2-24-95	BY JAR
2	RECORD DRAWING	DATE 10-2-92	BY JAR
1	MODIFIED AFTER RECEIPT OF BIDS	DATE 7-7-92	BY JAR
0	CFC	DATE 7-7-92	BY JAR

**UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

THIS DRAWING PREPARED BY  
**A. M. KINNEY, INC.**  
CONSULTING ENGINEERS  
CINCINNATI, OHIO

PROJECT NAME  
**ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS**

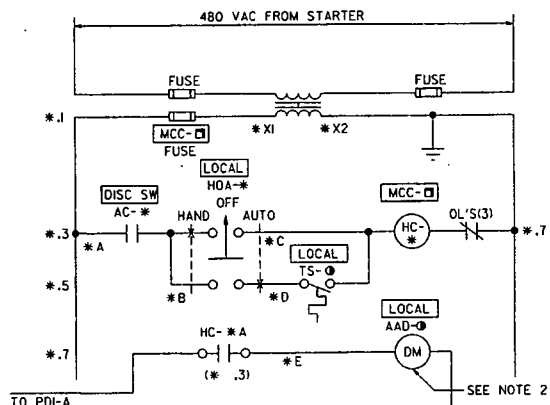
DRAWING TITLE  
**WASTEWATER TREATMENT IMPROVEMENTS - PLANTWIDE  
BUILDING 51 - HVAC POWER PLAN**

DATE 10-91	DESIGNED BY JAR	DATE 10-91	CHECKED BY JAR	DATE 7-92
DATE 10-91	DESIGNED BY JAR	DATE 10-91	CHECKED BY JAR	DATE 7-92
DATE 10-91	DESIGNED BY JAR	DATE 10-91	CHECKED BY JAR	DATE 7-92

8 / AWWT/AWWT0008.001

5632

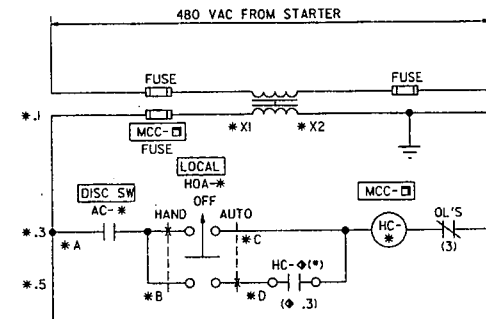
NOTES:  
1. THE WIRING DIAGRAM SHOWN ON THIS DRAWING IS A GENERAL DEPICTION OF THE DCS INTERFACE. FOR DETAILED INFORMATION, SEE DUBLIN TECHNICAL SYSTEM DRAWINGS.  
2.



TYPICAL SCHEME FOR

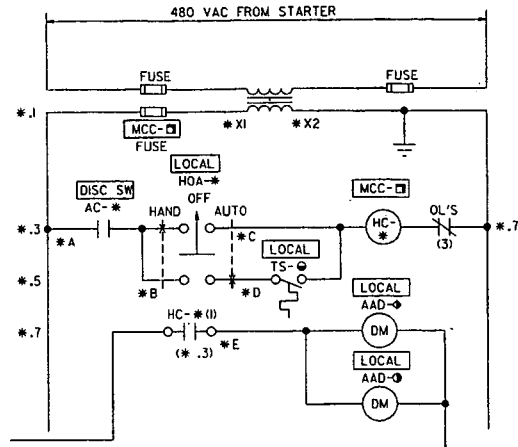
EQUIP. NO.	DESCRIPTION	*	MCC-3	CONTACT	PDI-A
EF-F1	PROCESS AREA EXHAUST FAN	EF-F1	MCC-3	1F	CIR 1
EF-F2	PROCESS AREA EXHAUST FAN	EF-F2	MCC-3	2F	CIR 1
EF-F3	PROCESS AREA EXHAUST FAN	EF-F3	MCC-3	3F	CIR 1
EF-F4	PROCESS AREA EXHAUST FAN	EF-F4	MCC-3	5F	CIR 3
EF-F5	PROCESS AREA EXHAUST FAN	EF-F5	MCC-3	6F	CIR 3
EF-F6	PROCESS AREA EXHAUST FAN	EF-F6	MCC-3	11F	CIR 4
EF-F7	PROCESS AREA EXHAUST FAN	EF-F7	MCC-3	12F	CIR 4
EF-F8	PROCESS AREA EXHAUST FAN	EF-F8	MCC-3	13F	CIR 4
EF-F9	PROCESS AREA EXHAUST FAN	EF-F9	MCC-3	14F	CIR 2
EF-F28	PROCESS AREA EXHAUST FAN	EF-F28	MCC-3	14F	CIR 2

REPOWER EXHAUST FANS EF-1 TO EF-6 FROM NEW 480V PDP, SEE DWG. 510-5500-E-01331



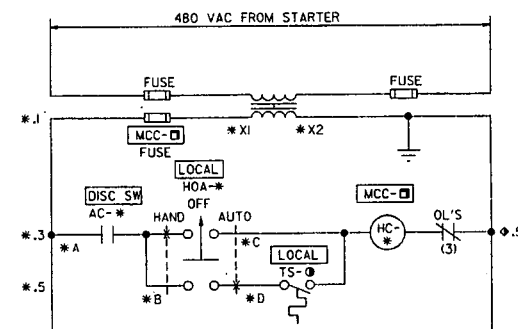
TYPICAL SCHEME FOR

EQUIP. NO.	DESCRIPTION	*	MCC-3	CONTACT	LINE(Φ .3)
51-X504-FAN	AUX. AIR FAN	X504	MCC-3	HCX505(2)	X505.3
EF-F4	PROCESS AREA EXHAUST FAN	EF-F4	MCC-3	HCMAU-1(1)	MAU-1.3
EF-F29	PROCESS AREA EXHAUST FAN	EF-F29	MCC-3	HCMAU-1(2)	MAU-1.3



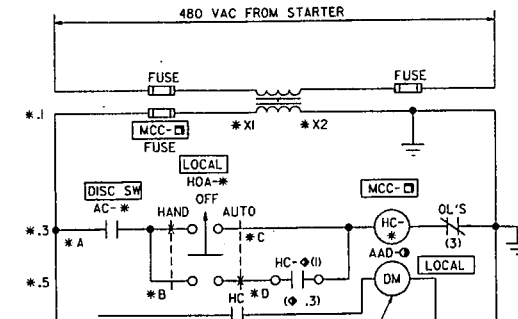
TYPICAL SCHEME FOR

EQUIP. NO.	DESCRIPTION	*	MCC-3	CONTACT	PDI-A
EF-F24	EQUIP RM EXHAUST FAN	EF-F24	MCC-3	16F-A	16F-B
EF-F26	MCC ROOM EXHAUST FAN	EF-F26	MCC-3	17F-A	17F-B



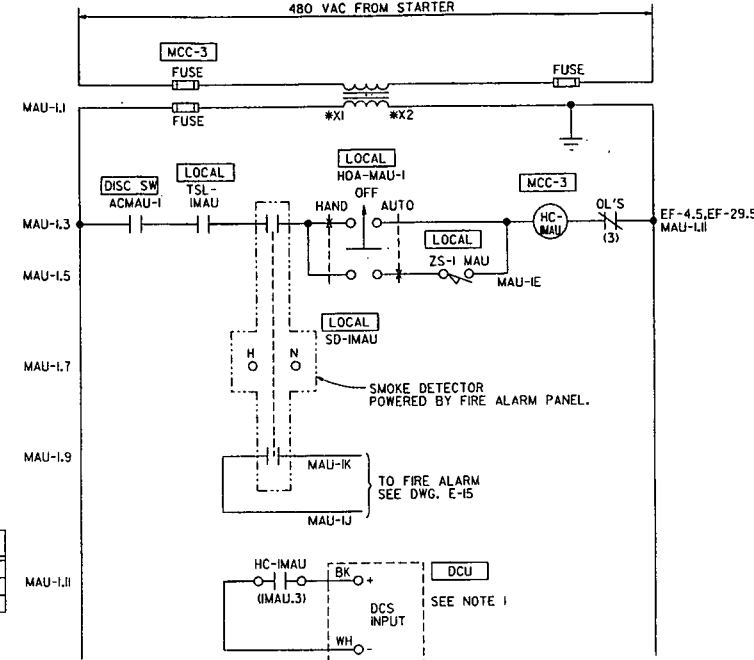
TYPICAL SCHEME FOR

EQUIP. NO.	DESCRIPTION	*	MCC-3	CONTACT	PDI-A
EF-F7	PROCESS AREA EXHAUST FAN	EF-F7	MCC-3	7F	EF-F8
EF-F9	PROCESS AREA EXHAUST FAN	EF-F9	MCC-3	8F	EF-F10
EF-11	PROCESS AREA EXHAUST FAN	EF-11	MCC-3	9F	EF-F12
EF-13	PROCESS AREA EXHAUST FAN	EF-13	MCC-3	10F	EF-F14



TYPICAL SCHEME FOR

EQUIP. NO.	DESCRIPTION	*	MCC-3	CONTACT	PDI-A
EF-F8	PROCESS AREA EXHAUST FAN	EF-F8	MCC-3	7F	EF-F7
EF-F10	PROCESS AREA EXHAUST FAN	EF-F10	MCC-3	8F	EF-F9
EF-12	PROCESS AREA EXHAUST FAN	EF-12	MCC-3	9F	EF-F11
EF-14	PROCESS AREA EXHAUST FAN	EF-14	MCC-3	10F	EF-F13



MAKE-UP AIR UNIT EQUIP NO MAU-1

LOCATION SYMBOLS LEGEND	
SYMBOL	LOCATION
LOCAL	AT OR NEAR MOTOR, SEE PLAN
MCC-3	MOTOR CONTROL CENTER #3 IN ELEC SWGR RM #115
DISC SW	LOCAL DISCONNECT SWITCH AT EQUIPMENT
DCS	DISTRIBUTED CONTROL SYSTEM
DCU	DISTRIBUTED CONTROL UNIT- ROOM 104
PDI-A	ROOM 117 (DRAWING E-5)

TO CORRELATE REFERENCED \* AMK SHEET No.6 \* TO FEMP DRAWING NUMBERS, SEE FEMP DRAWING No.510-4445-X-00425 & 510-4445-X-00426

REV.	NO.	DESCRIPTION	DATE	BY	CHK.
4	ADDED REPOWER CALLOUT PER RES 4518, PROJECT NO. 59600 "CAWNT"	SEP 6-94	8/12/94		
3	AS-BUILT PER RES #2617	MFG/GEF 5-26-95	5-23-95		
2	RECORD DRAWING	REV 2-24-95			
1	MODIFIED AFTER RECEIPT OF BIDS	JAR 10-12-92			
0	CFC	JAR 7-17-92			

**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

THIS DRAWING PREPARED BY  
**A. M. KINNEY, INC.**  
CONSULTING ENGINEERS  
CINCINNATI, OHIO

PROJECT NAME: ENVIRONMENTAL, HEALTH & SAFETY IMPROVEMENTS  
DRAWING TITLE: WASTEWATER TREATMENT IMPROVEMENTS - PLANTWIDE HVAC MOTORS' ELEMENTARY DIAGRAMS

DATE: 4-92  
DESIGNED BY: JAR  
CHECKED BY: JAR  
SCALE: NONE  
CLASS: 7-92

PROJECT NO.: 87-D-159  
WBS U2.4.01.02  
510-4445-E-00479  
E-23 4

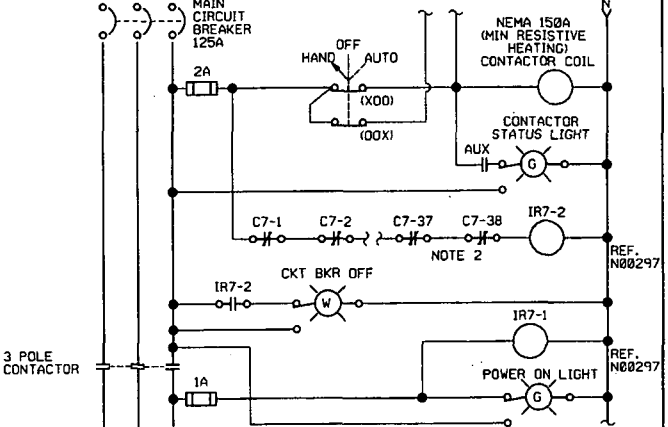
5632

NOTES

1. THERMOSTAT SHALL BE MOUNTED ON HT-7 PANEL EXTERIOR.  
2. CONNECT EXISTING STATUS CONTACTS IN SERIES.  
3. HEAT TRACE PANEL HT-7 TO BE RELOCATED. EXISTING REROUTED PIPING TO BE HEAT TRACED LIKE THE ORIGINAL. NEW PIPING TO BE HEAT TRACED PER SPECIFICATION SECTION 16855 (PROJ. NO. 59600 & RES 4518).

HEAT TRACE PWR DIST PNL HT-7

VOLTAGE : 208Y/120 VOLT 3PH, 4 WIRE  
MAIN BKR : 125 AMP  
MOUNTING : SURFACE  
REMARKS : 1. \*\* INDICATES SPACE FOR 30MA GFCI CLASS B BREAKER WITH B AUXILIARY STATUS CONTACT. BREAKERS WILL BE INSTALLED AS NEEDED.  
MAIN BUS : 225 AMP



DIRECTORY	WATTS LOAD			WIRE SIZE	BKR	L1 L2 L3			WIRE SIZE	BKR	L1 L2 L3			DIRECTORY
	L1	L2	L3			L1	L2	L3			L1	L2	L3	
CKT BKR STATUS				1	30	**			20	2				CIRCUIT #2
CIRCUIT #1				3	20	**			20	4				CKT BKR STATUS
CKT BKR STATUS				5	20	**			20	6				CIRCUIT #4
CIRCUIT #3				7	20	**			20	8				CKT BKR STATUS
CKT BKR STATUS				9	20	**			20	10				CIRCUIT #6
CIRCUIT #5				11	20	**			20	12				CKT BKR STATUS
CKT BKR STATUS				13	20	**			20	14				CIRCUIT #8
CIRCUIT #7				15	20	**			20	16				CKT BKR STATUS
CKT BKR STATUS				17	20	**			20	18				CIRCUIT #10
CIRCUIT #9				19	20	**			20	20				CKT BKR STATUS
CKT BKR STATUS														CIRCUIT #12
CIRCUIT #11														CKT BKR STATUS
CKT BKR STATUS														CIRCUIT #14
CIRCUIT #13														CKT BKR STATUS
CKT BKR STATUS														CIRCUIT #16
CIRCUIT #15														CKT BKR STATUS
CKT BKR STATUS														CIRCUIT #18
CIRCUIT #17														CKT BKR STATUS
CKT BKR STATUS														CIRCUIT #20
CIRCUIT #19														CKT BKR STATUS
SUB-TOTALS	0	0	0						0	0	0			SUB-TOTALS
TOTAL WATTS L1:0 TOTAL WATTS L2:0 TOTAL WATTS L3:0 TOTAL WATTS:0														

HEAT TRACE POWER DISTRIBUTION PANEL HT-7

CKT. NO.	PIPE LINE DESIGNATION	HEAT TRACE TYPE	NOTES
1	GW-12"-A-2899-ET	10BTVI-CR	GROUNDWATER SUPPLY; TIE POINT AT WEST PIPE RACK TO TNK-1 NOZZLE N1
1A	GW-10"-A-2899-ET	8BTVI-CR	GROUNDWATER SUPPLY; LCV-001 BY-PASS
2	GW-12"-A-2900-ET	10BTVI-CR	GROUNDWATER SUPPLY; FROM TNK-1 NOZZLE N4 TO GROUNDWATER PUMPS SUCTION MANIFOLD
2A	GW-8"-A-2900-ET	8BTVI-CR	GROUNDWATER SUPPLY; PUMP 1A SUCTION
2B	GW-8"-A-2902-ET	8BTVI-CR	GROUNDWATER SUPPLY; PUMP 1B SUCTION
2C	GW-8"-A-2904-ET	8BTVI-CR	GROUNDWATER SUPPLY; PUMP 1C SUCTION
3	GW-10"-A-2901-ET	8BTVI-CR	GROUNDWATER SUPPLY; GROUNDWATER PUMPS DISCHARGE MANIFOLD TO INSIDE BLOC 51.
3A	GW-8"-A-2901-ET	8BTVI-CR	GROUNDWATER SUPPLY; PUMP 1A DISCHARGE
3B	GW-8"-A-2903-ET	8BTVI-CR	GROUNDWATER SUPPLY; PUMP 1B DISCHARGE
3C	GW-8"-A-2905-ET	8BTVI-CR	GROUNDWATER SUPPLY; PUMP 1C DISCHARGE
4	GW-10"-A-2926-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM SCR-102 TOWARDS 24" DISCHARGE TEE
5	GW-10"-A-2926-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM 24" DISCHARGE TEE TOWARDS STRAINER SCR-102
6	GW-10"-A-2926-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM CENTER PIPE RACK TO INSIDE BLOC 51 & A-11
7	GW-10"-A-2926-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM STRAINER SCR-102 TO WEST SIDE OF CENTER PIPE RACK.
8	GW-6"-A-2945-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM STRAINER SCR-102 TO TOP OF TANK TNK-297.
9	GW-10"-A-2946-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM STRAINER SCR-102 TO TIE POINT AT WEST PIPE RACK.
10	GW-10"-A-2946-ET	8BTVI-CR	GROUNDWATER DISCHARGE; FROM STRAINER SCR-102 TO TIE POINT AT WEST PIPE RACK.
11	GW-2"-A-2955-ET	5BTVI-CR	AERATION TANK TNK-1; NOZZLE N-10 DRAIN & LSL-001 CONNECTION
12	BW-8"-A-7200-ET	8BTVI-CR	BACKWASH SUPPLY; FROM BACK WASH PUMPS DISCHARGE MANIFOLD TO MULTIMEDIA VESSEL INSIDE BLOC 51.
12A	BW-6"-A-7200-ET	8BTVI-CR	BACKWASH SUPPLY; FROM BW-8"-A-7200-ET SPLIT AT VALVE V51037 TO ION EXCHANGER INSIDE BLOC 51.
13	BW-8"-A-7200-ET	8BTVI-CR	BACKWASH SUPPLY; FROM BACK WASH PUMPS DISCHARGE MANIFOLD TOWARDS MULTIMEDIA VESSELS INSIDE BLOC 51.
14	BW-8"-A-7220-ET	8BTVI-CR	BACKWASH SUPPLY; FROM MULTIMEDIA VESSELS INSIDE BLOC 51 TOWARD BACKWASH PUMPS
14A	BW-6"-A-7227-ET	8BTVI-CR	BACKWASH SUPPLY; PUMP 2B DISCHARGE
14B	BW-6"-A-7229-ET	8BTVI-CR	BACKWASH SUPPLY; PUMP 2C DISCHARGE
14C	BW-6"-A-7231-ET	8BTVI-CR	BACKWASH SUPPLY; PUMP 2A DISCHARGE
15	BW-8"-A-7224-ET	8BTVI-CR	BACKWASH SUPPLY; FROM TANK TNK-297 TO BACKWASH PUMPS SUCTION MANIFOLD.
15A	BW-8"-A-7226-ET	8BTVI-CR	BACKWASH SUPPLY; PUMP 2B SUCTION
15B	BW-8"-A-7228-ET	8BTVI-CR	BACKWASH SUPPLY; PUMP 2C SUCTION
15C	BW-8"-A-7230-ET	8BTVI-CR	BACKWASH SUPPLY; PUMP 2A SUCTION
16	N/A	N/A	NOT USED
17	N/A	N/A	NOT USED
18	N/A	N/A	NOT USED
19	N/A	N/A	NOT USED
20	N/A	N/A	NOT USED

REF DWG NO.	DRAWING TITLE
95X-5900-X-00318	DRAWING INDEX - SHEET 1 OF 6
95X-5900-N-00297	DISCRETE I/O DIAGRAM - SHEET 10

2	HEAT TRACE PANEL (HT-7) TO BE RELOCATED. ADDED NOTE 3 PER CAWWT PROJECT 59600 AND RES 4518	TH	N/A	9/30/98
1	MODIFIED PER RED-LINES/AS-BUILT CONDITION.	TH	N/A	10/03/97
0	CERTIFIED FOR CONSTRUCTION, INCORPORATED FID DCN# 1710070; ADDED HEAT TRACE POWER PANEL HT-7.	TH	N/A	10/03/97
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	PERIOD	DATE

**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**  
THIS DRAWING PREPARED BY  
**PARSONS**  
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.  
CINCINNATI, OHIO  
PROJECT NAME  
**ADVANCED WASTE WATER TREATMENT EXPANSION PROJECT**  
DRAWING TITLE  
**ELECTRICAL PANEL SCHEDULE**

DRAWN BY D. TOPE	DATE 08/12/97	CHECKED BY T. FERRELL	DATE 10/01/97	DESIGNED BY H. ROBBERS	DATE 09/17/97
PLANT/AREA NO. BLOC 51	FLOOR	SCALE	NONE	CLASS	
SUBMITTED FOR APPROVAL T. HILES 10/03/97	PERMANENT APPROVAL N/A				N/A

PREPARED UNDER PARSONS PROJECT ORDER NUMBER ARP/P0126	DATE PROJECT NO. WBS 00-90701	DRAWING INDEX CODE NO. 95X-5900-E-00486	SHEET NO. E0017	REV. NO. 2
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